AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

JUNE 15, 1954

In This Issue

A CHILTON PUBLICATION

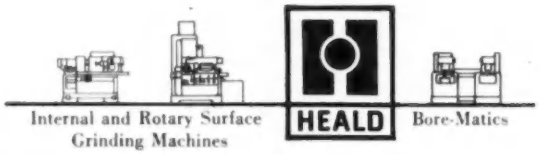
. . . Seen any lamplighters lately?

THE lamplighter's job seemed pretty secure . . . until someone discovered how to light a lamp without a flame; turn it out at the flick of a switch. Then the lamplighter disappeared — but a whole new industry was born.

For competition is at work everywhere, constantly directing the shape of things to come. Products that are better or less costly forge ahead — others are left behind.

Today, with competition rising to a normal, healthy pitch, manufacturers everywhere are seeking new ways to improve production and cut costs. That's where we at Heald can help you. In the vital matter of precision finishing, new Heald machines and advanced Heald engineering can often effect substantial savings—improve production speed and product quality too! Ask your Heald representative about the latest developments in automation, simultaneous and progressive borizing, improved grinding and loading methods.

Competition is wonderful if you're *ahead* of it. Our business is to help keep you there. That's why IT PAYS TO COME TO HEALD.



Internal and Rotary Surface Grinding Machines

Bore-Matics

THE HEALD MACHINE COMPANY

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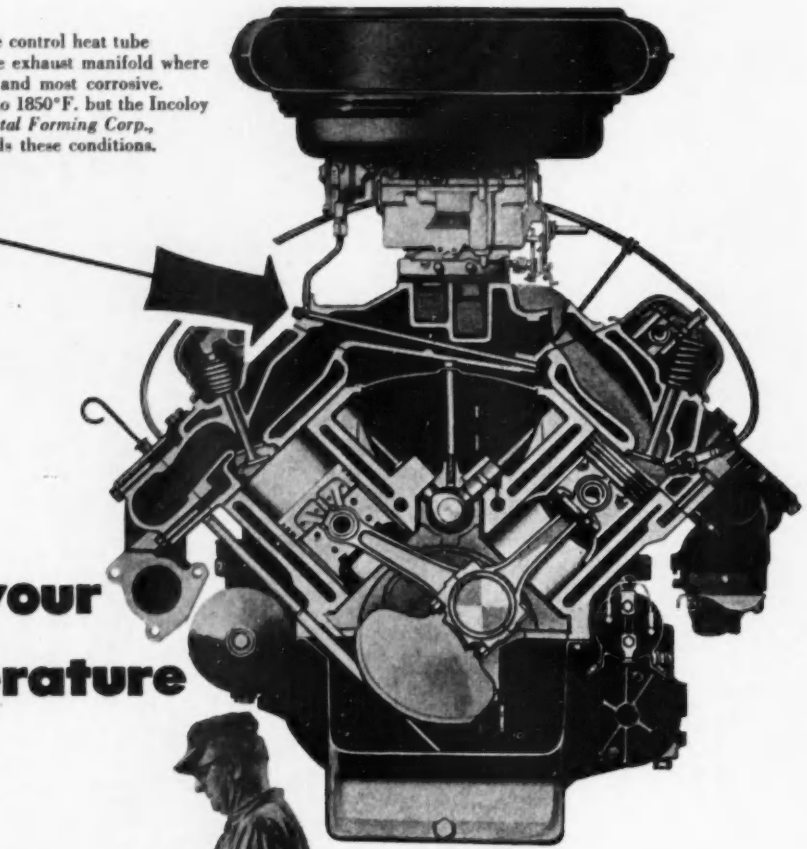
The Incoloy choke control heat tube passes through the exhaust manifold where gases are hottest and most corrosive. Temperatures go to 1850°F. but the Incoloy tube, made by *Metal Forming Corp.*, Elkhart, withstands these conditions.



Does this suggest an answer to your High Temperature Problem?

Incoloy tubes pass a "go-no go" gauge test at final inspection. Outside tolerances are held to .340-in. to .345-in. diameter on these welded tubes made by *Metal Forming Corp.*, Elkhart, Indiana.

The arrow you see points to an automatic choke heat control tube buried in the exhaust manifold. It pre-heats fresh air rushing to the choke thermostat and in operation it glows like the element of an electric stove.

Its inside wall is subject to oxidation; its external wall to the corrosive attack of 1850°F. exhaust gases. Yet it is relatively thin-walled (0.030-in.) for efficient heat transfer. What metal has the strength and corrosion resistance to withstand these conditions for the life of the engine?

To find out, six auto manufacturers independently tested several metals. All of the tests pointed to Incoloy as the practical answer. It had strength, resistance to oxidation and corrosion at high temperatures; and did not flake off oxide scale which could clog the choke thermostat. All six of these manufacturers now use Incoloy choke heat control tubes.

As for fabrication, at the *Metal Forming Corporation*, Elkhart, Ind., the Incoloy strip is first rolled into tubular shape, welded by the Heliarc process, and then reduced to the proper diameter by swaging (no intermediate anneals needed). Finally, one end is tapered and the other expanded. It's a wonderful example of Incoloy's workability.

Perhaps Incoloy or one of the other Inco Nickel Alloys has the right combination of properties to solve a metal problem of yours. Inco's Technical Service Section will gladly help you find out.

For a brief summary of the Inco Nickel Alloys and some of their industrial applications, write for "Standard Alloys For Special Problems."

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67 Wall Street New York 5, N. Y.

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Inconel "W"® • Incoloy®
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Low Carbon Nickel • Duranickel®

A CHILTON MAGAZINE AI PUBLISHED SEMI-MONTHLY

AUTOMOTIVE INDUSTRIES

JUNE 15, 1954 VOL. 110, NO. 12

FEATURES

NEWS PREVIEWS

DEPARTMENTS

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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Quality of job	Mediocre	Good
Appearance	Dull	Sparkling
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Convenience	Problem of protection, acid disposal	No problems
Maintenance	Expensive	Greatly reduced

Lefere Forge Co., Jackson, Mich., supplier for Ford, Budd Co., and many other automotive firms, is almost completely mechanized in operation . . . from the first step to the last, the work *flows*.

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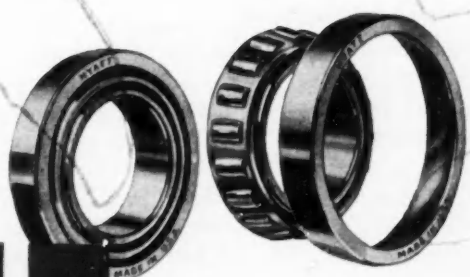
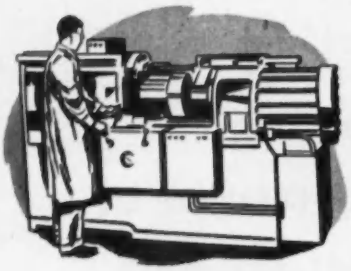


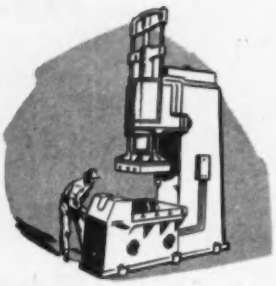
Got a bearing problem? Just reach for Hyatt's new Barrel Bearing Catalog! This is one catalog engineers have been waiting for, because it's essentially *a guide to lower maintenance costs!* Barrel Bearings are not only dual-purpose in design; they're also *self-aligning*. They operate with full efficiency under misalignment conditions which cause excessive wear in ordinary bearings. If *your* job involves bearing specifications, make sure you have Hyatt Catalog No. B-154. It puts a complete line of Barrel Bearings right at your finger tips. Write to Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT

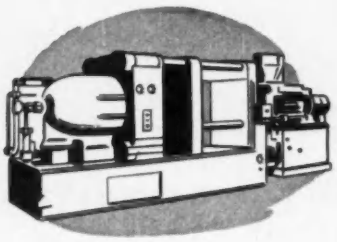
STRAIGHT BARREL TAPER



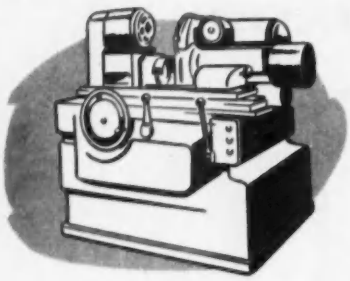
For hydraulic systems on all types of injection molding machinery.



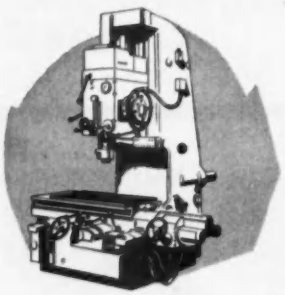
For hydraulic systems on all types of presses and forging hammers.



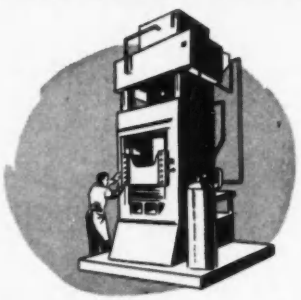
For hydraulic systems on all types of plastics molding equipment.



For hydraulic systems on grinding machines and other production tools.



For hydraulic systems on jig borers and other metalworking machinery.



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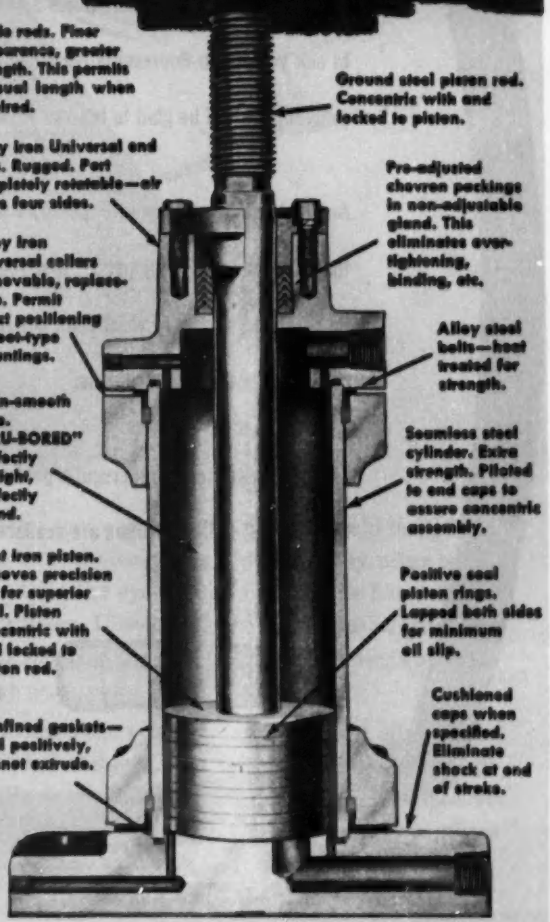

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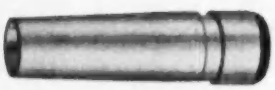
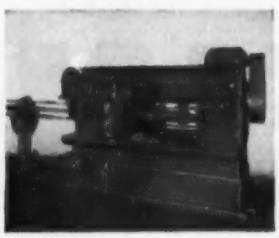
The part illustrated is from regular production runs with HSS and 100% carbide tipped tools. Full particulars are available.



MATERIAL—COPPER: Hole drilled with ½" dia. drill to 3" depth; taper formed on OD.

	HSS	CARBIDE
Cycle Time	45 secs.	16 secs.
Work Spindle Speed	670 R.P.M. at 110 S.F.	2026 R.P.M. at 398 S.F.
Tool Wear	150 pcs. per grind	2500 pcs. per grind



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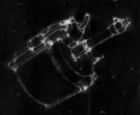

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Specified by more car manufacturers than any other make, Bendix Low Pedal Power Brake makes possible quick, sure stops by merely pivoting the foot from stop-and-go controls. No need to lift the foot and exert leg power to bring the car to a stop. Result—more driving comfort, less fatigue and greater safety!

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With over four million in use, the Bendix Hydrovac is by all odds the world's most widely used power brake for commercial vehicles. This overwhelming preference for Hydrovac is a result of sound engineering design, exceptional performance, low original cost and minimum service upkeep.

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*REG. U.S. PAT. OFF.

The term "Bendix Power" not only identifies the industry's outstanding power braking and power steering equipment, but describes the unmatched engineering and manufacturing resources behind these products.

It is well that Bendix Products Division be thought of in this dual capacity, for the outstanding acceptance of Bendix power units stems largely from the fact that industry has learned over the years to look to Bendix for the latest and best in power equipment for cars, trucks and buses.

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High Spots of This Issue

★ Complex Grille Unitized

Keen students of automotive styling have no doubt wondered how the distinctive grille and bumper on the new Cadillac are formed. Here, in written and pictorial form, is the explanation of how this integral sub-assembly is turned out. Page 32.

★ Unusual Temperatures in Brake Drums

Long a subject of heated debate, brake drum temperature measurement remains, nonetheless, an important factor in determining brake lining deterioration. The authors present in this article their solution to the problem. See Page 34.

★ Design Details of the Napier Nomad Aircraft Engine

Hailed as the first compound Diesel-gas turbine, a number of novel features distinguish the British Napier Nomad. Its design and operational details are fully described and illustrated in a direct report from England. See Page 38.

★ Record Breaking Speeds Clocked at Indianapolis "500"

For the second year in a row Bill Vukovich and his Fuel Injection Special roared to victory with a record average speed of 130.84 mph at the Indianapolis classic. Details of his win are included in this lap-by-lap account. Page 42.

★ Plastic Truck Body Weighs 60 Per Cent Less

The delivery truck field is one of the latest spheres into which versatile plastics have expanded. Described here is all-plastic body now being produced by Lunn Laminates for United Parcel Service use in urban areas. Page 52.

★ 55 New Product Items And Other High Spots, Such As:

Huge spar and skin mill; Fiat experimental car; advanced automation techniques; reusable airframe jigs; Vickers hydraulic forum; French car maker has automatic plating plant; flexibility for producing customized truck bodies; portable air compressors; trends in powder metal applications.

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News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 110, No. 12 June 15, 1954

Automobile Workers Get Five-Cent Pay Increase

A five-cent hourly increase has been granted to more than a million automobile workers under UAW-CIO contracts with the car companies. The wage increase, the last under current five-year contracts, was provided by the annual "improvement factor," which is based on technological progress and other productivity improvements. However, the net gain amounts to only four cents, due to a decline in the Bureau of Labor Statistics cost-of-living index.

The increase, which went into effect June 1, brings the average hourly base rate in the automobile industry to about $2.08. Salaried employes also benefit from the "improvement factor," since their pay goes up about $5 a quarter for each cent-an-hour increase in the pay of production workers.

Since the improvement factor was included in labor contracts in 1948, workers have received 56 cents in hourly wage increases. Thirty-one cents of this total has been paid directly under the improvement factor, while the remainder came from the cost-of-living factor.

American Motors to Assemble Its 1955 Cars in Wisconsin

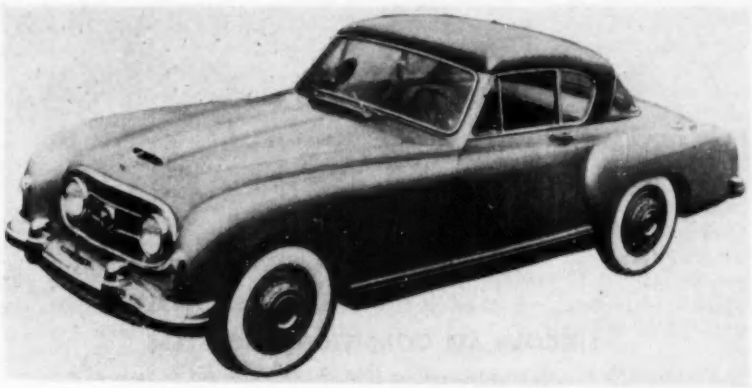
American Motors Corp. has announced that it will concentrate its 1955 model assembly of both Nash and Hudson cars in its plants in Milwaukee and Kenosha, Wis. Bodies for each line of cars will be built and trimmed in the corporation's main body plant in Milwaukee.

Final assembly of all Nash and Hudson lines will take place at the Kenosha plant. Body production will also continue at Kenosha.

Hudson plants in Detroit will be utilized for production of engines and other components for Hudson cars, defense production at about present rates, and various service parts operations, including machining. The changes will be completed at the end of the current model season. Meanwhile, car schedules will continue substantially at present levels until late in the year.

Concentration in Wisconsin was reportedly dictated by the completeness of facilities there. They include not only the modern body and assembly plants, but foundries, forge shops, engine, axle and transmission facilities, many of which are not available in the firm's Detroit plants.

A special task group is said to be working on the development of new business, in the form of automobile components, parts fabrication or additional Government work, that might be carried out in the Detroit plants. Present employment in Hudson plants in Detroit totals approximately 8600. Without additional business, payrolls at the Hudson plants there would total around 4000 late this year.



1954 NASH-HEALEY SPORTSTER

Low silhouette top, continental coachwork by Pinin Farina, and wrap-around rear window treatment are designated as prime features of the 1954 Nash-Healey LeMans hardtop sports coupe. Priced at $5128, f.o.b. coastal port of entry, the car is powered by the Nash Ambassador LeMans Dual Jetfire six-cyl, 140-hp engine.

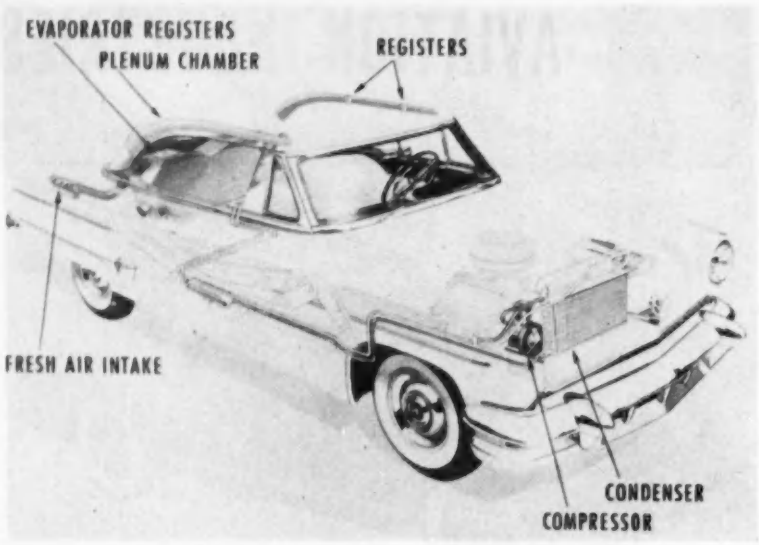
Cadillac Progressing On Expansion Program

The major part of Cadillac Motor Car Division's multi-million dollar expansion program, which is expected to increase production capacity by 40 per cent, is nearing completion. The company reports the entire program will be completed by the time its 1955 cars are introduced.

The Cadillac program is part of General Motors' billion-dollar expansion program. Construction of a three-story, block-long plating building at the main Clark Ave. plant in Detroit has already been completed, and the division is in the process of transferring machinery to the new annex.

In addition, two other plants have been taken over by Cadillac in Detroit. These include the plant used formerly by Detroit Transmission Div., where Cadillac will have its parts and service facilities, and a plant on Wesson Ave., which Cadillac has rearranged for its ordnance work.

News of the AUTOMOTIVE



LINCOLN AIR CONDITIONING SYSTEM

Now available as optional equipment on 1954 Lincoln sedans and hardtops at a suggested list price of $575 is the 170-lb air conditioning system illustrated above. The control system, located on the instrument panel, is said to offer a wide range in temperatures and a variable volume. Cooled, filtered, and dehumidified air is supplied through four inlets located on each side of the car under the roof just above the passenger seats. The volume can be adjusted independently for either side of the car. Each inlet has a rotary register for independent directional control of the cool air flow. Freon 12 is the refrigerant used in the system.

Higher Horsepower Trend To Continue in 1955

All indications point to a continuation of the upward trend in engine horsepowers next year. Four new engines—Chevrolet, Pontiac, Plymouth, and Packard—are sheduled, and all certainly will have much more power than their predecessors. It is understood that other makers also are planning to increase output on the order of 10 to 20 hp or so, and the top limit is expected to be in the area of around 250 hp.

Tubeless Tires Coming As a No-Cost Option

Tubeless tires as a factory-installed option at no extra cost are said to be coming within the next month. One of the independents reportedly will offer customers the choice of tubeless or conventional tire and tube combinations around the first of July.

Other manufacturers may do the same within a few months and certainly will have them for 1955 models. There are reports that at least one company is planning to make tubeless tires 100 per cent standard equipment next year.

Reports Link Chrysler With Auto-Lite Firm

The acquisition of Electric Auto-Lite Co. by Chrysler again is a subject of intense speculation in Detroit. Both companies decline to comment and say that no negotiations to that end are going on.

Reliable reports, however, indicate that talks were under way before the death of Royce Martin, Auto-Lite president and chairman, May 1. The addition of Auto-Lite, which does more than half its business with Chrysler, to the Chrysler divisions would fit logically into the developing pattern of the firm's decentralization and reorganization program.

Packard Leases Body Plant From Chrysler

Packard Motor Car Co.'s acquisition of the former Briggs-Conner plant in Detroit from Chrysler is another of several steps in Packard's modernization program and marks the company's return to making its own bodies after 13 years. Packard is taking over the plant under a five-year lease agreement with Chrysler with an option to buy it and the manufacturing facilities within that time.

Chrysler acquired the plant, built in 1940 for aircraft production, last December in the Briggs purchase, and continued to produce bodies for Packard under an agreement between the two companies. Briggs has been turning out bodies for Packard since 1941.

The plant provides 760,000 sq ft of manufacturing area and includes a dual conveyor line system with straight line assembly, spray booths and body drying ovens, and has high ceiling areas which permit maximum natural light and headroom. It is located on a 24-acre site.

While Packard did not indicate its complete plans, there is a possibility that other operations may eventually be moved into the newly-acquired plant. Packard will continue to receive its body stampings from its present sources—Budd Co. and Chrysler.

Packard's $50 million program for its Utica, Mich., plant, which will turn out V-8 engines, automatic transmissions and axles, is moving ahead on schedule. It is expected to be completed in time for 1955 models.

Chevrolet May Build Nomad Station Wagon

There is speculation in Detroit that Chevrolet may produce its Nomad station wagon built on Corvette chassis as a limited production item. The vehicle currently is built in plastic, has been shown at the GM Motorama and automobile shows around the country, and has received very favorable comment. Whether it would be built in plastic or steel is not clear at the moment.

AND AVIATION INDUSTRIES

Caterpillar York Plant Includes Latest Equipment for Producing Track Parts

Improved parts service to its eastern and export customers and expansion of its manufacturing facilities have been achieved by Caterpillar Tractor Co. with the recent opening of its new plant at York, Pa. The 770,000 sq ft facility is a fitting tribute to the firm's 50th anniversary this year.

The dual-purpose plant manufactures certain replacement parts for the company's line of track-type tractors and also serves as a regional storage and shipping center for its entire parts line. It represents the latest addition to Caterpillar's sizable investment in new and improved facilities since the end of WW II and brings the total to $150 million.

Metallurgical Laboratory

One of the most modern facilities at the plant is the metallurgical laboratory, which is provided with the latest equipment for quick and accurate tests of steels and non-ferrous products. This equipment is designed to help ferret out troubles which may be encountered in the different heat treating processes in the shop.

Hardness testers determine the response to quenching and tempering of the parts, while other equipment is provided for examining the internal structure of the steel parts after heat treatment. The results of heat treatment are assessed with these instruments to determine the efficiency of the hardening operation applied to all components used in the track.

Heat Treating Facilities

Parts for the track, as received from the vendor, still have the coarse grain structure that was produced in the forging operation. These forgings receive grain refining treatment in a cycle annealer.

The furnace, approximately 100 ft long, can handle a 3000 lb load of steel every 50 min. The parts are heated for approximately three hours and then allowed to cool slowly to promote softening and a proper grain structure for machining. The total time through the furnace is approximately 12 hours. Track roller shafts are cooled with a gas blast quench to reduce grain size and impart greater toughness to the shaft.

Other parts, such as links, are quenched in circulated water to the full hardness obtainable. After tempering, they have a fine grained, tough structure that is durable in service. The wear surfaces are then induction-hardened by the use of high-frequency alternating current. After quenching, they go into a tempering furnace in order to restore the right degree of toughness.

Bushings, Pins, Shoes

Track bushings are machined from special carburizing grade material. After machining, they are loaded into pit type gas carburizing furnaces. The duration of the carburize cycle is approximately 32 hours.

Bushings then go to the induction heating furnace, are quenched, and then moved through a tempering furnace. Track pins are induction heated, water quenched, and passed through a tempering furnace.

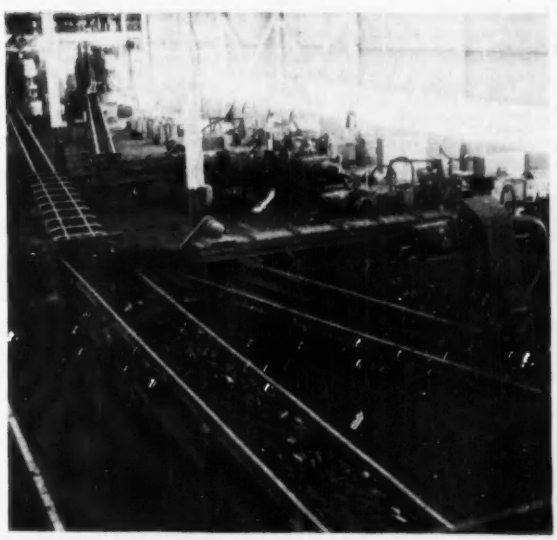
Track shoe stock is rolled to desired shape at the steel mills. After receipt, it is automatically delivered to the cold shears, sheared to length, drilled, and conveyed to the hardening furnace. At the end of the hardening furnace rows of plates are advanced by breaking the beam of an electric eye onto a quench elevator.

The elevator lowers the plates into the high pressure circulating oil tank for quenching. The plates are moved into the tempering furnace. From the tempering furnace on a high speed conveyor the parts go to induction hardening of the grouser.

Although several new machines operating in the York plant were designed and built by Caterpillar engineers, scores of others bear such familiar names as Ingersoll, Fay, Natco, Bliss, Tocco, Cincinnati, Sundstrand, etc. The machines themselves, various handling devices, and an extensive network of conveyors throughout the plant are all geared to a relatively highly automated type of operation.

Nash, Hudson Link Parts Operations

Parts and accessories warehouse facilities of Nash and Hudson will be among the first departments to be consolidated under the newly formed American Motors Corp. The two divisions reportedly are studying the most feasible plan for action soon.



Shown here is a view of the track link machining operation at the Caterpillar York plant. Extensive use has been made of conveyors and automated batteries of machines.

News of the AUTOMOTIVE

Kenilworth Steel Holds Novel Production Show to Demonstrate New Ideas

One of the most unusual trade shows in the industry was held last month among stacks of steel and aluminum in the warehouse of Kenilworth Steel Co., Kenilworth, N. J. Sponsored by Kenilworth's president, John G. Berry, the aim of the exhibition was to "stimulate competition through presentation of new ideas in action."

Altogether, some 32 companies put on display a total of approximately 200 new production ideas. According to Mr. Berry, not all of the exhibits were necessarily confined to the steel industry, but all were chosen for their stimulating effect on business generally.

About 10,000 persons attended the week long Kenilworth Klinic. Exhibitors claimed that there was very heavy buying of some items and a great deal of interest displayed in all.

Machines, Tools, and Paper

Kenilworth Steel had its various machines in operation during the affair. One unit, a four-high reversing cold rolling mill for reducing steel thickness, was equipped with a Pratt & Whitney Model 10A magnetic continuous thickness gage. The gage has a range from zero to ¼ in. with an accuracy of 0.00005 in. A slitting mill used by Kenilworth utilized a P&W Beta-Ray non-contacting type continuous gage. Other P&W equipment was also shown in operation.

DoAll had a large staff on hand demonstrating its various new machines and new blades. Alcoa had an aluminum welding demonstration and an electrobright finishing exhibit.

Sherman Paper Products Corp. displayed a new cold sealing paper which has been extensively tested by the automobile makers. In fact, one large passenger car producer has already started to use the product for the protection of body trim. This paper is coated with a latex solution which adheres only to itself when dried and not to the material.

Yale & Towne had a great deal of equipment in operation performing actual handling jobs. This company's feature attraction was the new 2000-lb capacity "safety silhouette" fork truck which is now available.

Utica Drop Forge drew much attention with its improved tools and methods for the relatively new process of cold welding metals. Rigidized Metals showed some new designs of embossed metals for beauty and structural strength. It was learned that a 1955 passenger car will utilize one of the newer patterns for interior functional trim.

Other Exhibits

An automatic feeder was demonstrated by personnel of V & O Press, producers of the product. This unit, which has a rather high production rate, was mounted on a V & O press. It picks the part off a rotary table and inserts it into the press.

U. S. Tool Co. declared it was meeting competition with production of a new coil cradle which will carry up to nine-in. widths of steel with a weight capacity of 1000 lb. New methods of utilizing steel strapping were shown at the Signode booth.

Two features of the Minnesota Mining & Mfg. exhibit were the combination package bundler and a new fiber tape. Both of these products are being used for automotive parts.

Other companies which exhibited their products included: Acme Tube Inc.; Adams Stamping Corp.; Air Reduction Sales Co.; American Chain & Cable Co., Inc.; Denney Tag Co.; Electro-Glo; Frederick Gumm Chemical Co.; Harrington, Wilson & Brown; Metal Carbides Corp.; Transparent Products Co., Inc.; Wilson Mechanical Instrument Div.; Barry Mfg. Corp.; Klingelhofer Machine Tool Co.; Ferdon Equipment Co.; Radiant Lamp; Dodge-Newark; and Automatic Methods, Inc.

FIVE MONTHS CAR OUTPUT IN POST-WAR THIRD PLACE

1954 Passenger Car Production

As reported to Automotive Industries by the car factories

	May 1954	April 1954	May 1953	Five Months 1954	Five Months 1953
Chrysler	8,185	9,948	15,136	49,185	82,221
De Soto	5,387	6,650	12,469	32,859	60,069
Dodge	11,368	13,603	27,794	56,065	148,738
Plymouth	33,697	39,423	56,367	172,693	274,382
Total Chrysler Group	58,637	69,524	111,756	310,802	565,410
Ford	125,698	128,190	69,992	623,908	413,254
Lincoln	2,966	3,313	6,542	19,218	22,398
Mercury	22,336	22,296	17,318	130,304	103,316
Total Ford Group	151,000	153,799	93,852	773,028	538,968
Buick	51,183	54,636	49,162	237,794	224,417
Cadillac	11,250	12,444	10,510	49,461	51,843
Chevrolet	130,957	140,588	139,474	630,314	629,599
Oldsmobile	43,045	45,840	36,950	179,793	156,570
Pontiac	31,925	35,091	42,789	166,116	185,611
Total G. M. Group	268,360	288,798	278,905	1,263,478	1,250,040
Hudson	2,450	1,803	8,290	10,618	44,875
Nash	6,020	5,899	17,017	32,351	81,138
Total American Motors	8,470	7,702	25,307	42,969	126,013
Henry J			443		5,812
Kaiser	1,425	1,163	2,602	4,449	12,539
Willys	1,551	2,239	2,070	6,997	24,317
Total Kaiser Motors	2,976	3,402	5,115	11,446	42,668
Packard	1,557	3,372	9,783	16,542	50,762
Studebaker	4,691	7,427	22,329	37,229	84,164
Total All Makes	495,691	534,025	546,847	2,455,494	2,656,025

Packard, Buick Modify Automatic Drives

Packard is working on an improved version of its Ultramatic transmission, but details of the changes are not known now. It is expected to be ready for introduction on 1955 models. The Buick Dynaflow also is undergoing some important modifications for next year's model.

AND AVIATION INDUSTRIES

SHOOTING TAIL

The tail turret of a B-47 Stratojet medium bomber is shown being installed here by Boeing Airplane Co. technicians. Designed by General Electric Co., the tail turret contains twin 20-mm cannon operated by a radar-controlled gunnery system. Above turret at base of vertical tail is radome housing the systems' electronic gear.

Packard—Studebaker Tie-up Under Study

Rumors of further mergers in the automobile industry still persist. A Studebaker-Packard tie-up is being urged by financial interests who are submitting proposals to both managements. Indications are that both companies are willing to consider the matter seriously if they can get together on the right basis.

There are no negotiations going on directly between the principals at the moment, however, as far as is known. Nonetheless, a merger of the two companies is possible and quite logical, since their product lines do not overlap materially. There also is a good possibility that, if an amalgamation is successful, it may include a third company, possibly a supplier.

Coaxial Steering Planned For 1955 Dodge, Plymouth

Both Dodge and Plymouth are expected to switch over to Chrysler's new coaxial power steering on 1955 models. Chrysler is building the unit itself at its Trenton, Mich., plant.

AI TABLOID

U. S. Rubber Co. has launched production of Koylon foam rubber products at its new Santa Ana, Calif., plant. The company expects that the tubeless version of its new Royal 8 tire will be original equipment on several 1955 cars.

* * *

Plans are shaping up rapidly for Kentucky's initial turnpike route. The toll road will be about 40 miles long and run from Elizabethtown to Louisville.

* * *

Standard Oil Development Co. is offering a new process for cutting gasoline refining costs . . . Cities Service is bringing out a new 5-D Koolmotor multi-range motor oil.

* * *

F. J. Stokes Machine Co. has undertaken a $1 million expansion program . . . North American Aviation has begun work on a $557,000 expansion of warehousing and office facilities at Downey, Calif. . . . Parker Rust Proof Co. is launching its third expansion in four years.

* * *

The Army's Watertown, Mass., Arsenal Laboratory has developed a new lightweight titanium alloy.

* * *

The first phase of an expansion program has been recently completed by General Electric Co. at its Taunton, Mass., plastics plant. An Operations Research section also has been created by the Plastics Dept.

* * *

Chevrolet has started initial operations at its new Tonawanda, N. Y., forge plant.

* * *

Naugatuck Chemical Div. of U. S. Rubber Co. has licensed out its new Marvibond process for bonding vinyl chloride resin to sheet metal.

Baldwin-Lima-Hamilton Corp. is buying back 515,000 shares of its own stock from Westinghouse Electric Corp. In the future, it will get electrical equipment for Diesel locomotives from General Electric, since Westinghouse is withdrawing from this market.

* * *

Birdsboro Steel Foundry & Machine Co. has received an offer for its assets equivalent to $20 a share on stock now outstanding. It will be submitted to stockholders.

* * *

Budd Co. has purchased an interest in Carel, Fouché & Cie., French railway car builder . . . Directors of Air Reduction Co. have approved the acquisition of Colton Chemical Co. . . . Computer Corp. of America has been purchased by Bruno-New York Industries.

* * *

Gulf Oil Corp. has completed a $50 million expansion program at its Philadelphia refinery.

* * *

Northrop Aircraft has developed a high-performance computer for the Air Force . . . General Electric is turning out a small cartridge-type starter for the Martin B-57 . . . A British firm has come up with a high-speed paint for jets.

* * *

R. M. Hollingshead Corp. is embarking on a new development and expansion program. It includes a new plant at Sunnyvale, Calif.

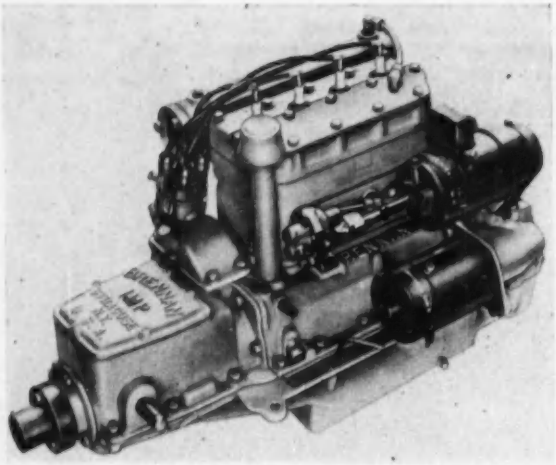
* * *

The Tubular Products Div. of Babcock & Wilcox Co. has completed an expansion program. It has also opened a new Cincinnati sales office.

* * *

Patents covering the use of new and improved alloys in storage batteries have been granted to Electric Storage Battery Co.

News of the AUTOMOTIVE



TINY ENGINE

Only 26 in. long and weighing but 160 lb, the "Imp" midget inboard marine powerplant develops a maximum of 27 hp at 5000 rpm. Produced by Brennan Motor Mfg. Co., the engine has a number of parts made as light but strong closed die forgings. The nickel iron cylinder block and aluminum base and oil pan also contribute to the weight reduction.

Du Pont Set for Full Output of New Polyester Film

By way of a progress report on the numerous applications being found for its tough new "Mylar" polyester film, the Du Pont Co. held in New York last month an exhibition of working displays showing its properties and varied uses. In addition to its proven merits for electrical insulation, industrial laminations, laminating bases, liners, metalizing bases, printed film, protective film, and tapes, the wonder material is also finding a number of automotive and aircraft applications.

For example, Mylar has already been employed in aircraft electrical and electronic equipment, and it is also being used in honeycomb structures. In the automotive field, metalized Mylar is being adapted for kickplates, scuff plates, and other interior applications, since it can be readily laminated into steel. One major automobile manufacturer is also experimenting with it for chromium replacement, while others are trying metallic yarn in upholstery materials.

Production of Mylar has thus far been on a pilot plant basis. However, operations are expected to begin this summer in the Film Dept.'s new $10 million plant at Circleville, O. Currently made in gages of 25 to 750 and in thicknesses of ¼ to 7.5 mils, the film will be turned out in sheets up to 60 in. wide at the new facility.

Briggs Aircraft Contracts Transferred to Chrysler

Transfer of two important defense contracts for aircraft parts and subassemblies to Chrysler Corp. from Briggs Manufacturing Co. has been announced. Production on the Air Force contracts had been carried on by Briggs as a subcontractor of the Boeing Airplane Co., in two Detroit plants which were included in Chrysler Corp.'s purchase last December of all Briggs automotive body facilities.

However, due to certain unresolved questions between Briggs and Boeing at the time of the transfer of plants and facilities, the aircraft work continued with Briggs in the two plants leased from Chrysler. It involved parts and sub-assemblies for the B-47 jet bomber and the KC-97 Stratofreighter tanker-transport.

The aircraft production will continue in the plants now performing this work, and will be administered by the Automotive Body Div. of Chrysler Corp.

Chrysler Developing New Air Conditioner

Chrysler reportedly will replace its present air conditioning unit with a substantially improved version on 1955 models. It is said to be more compact and less costly.

The company also has another unit in the works for the future. This latter air conditioner reportedly will have all the mechanism located under the hood with no trunk space utilized.

Chapline Chosen as Sponsor Of SAE Production Forum

George F. Chapline, vice-president and general manager, Engine Div., Fairchild Engine & Airplane Corp., has accepted sponsorship of the 1955 SAE Aeronautic Production Forum.

CAR AND BUS SALES RISE IN APRIL BUT TRUCKS OFF
1954 U. S. Motor Vehicle Factory Sales*

	Passenger Cars	Trucks	Buses	Totals 1954	Totals 1953
January	454,562	96,167	401	551,130	565,172
February	446,676	87,141	326	534,143	583,001
March	531,529	101,177	296	633,002	700,686
April	534,667	96,723	379	631,769	723,532
Total—Four Months	1,967,434	381,208	1,402	2,350,004	2,572,390

1954 U. S. Motor Truck Factory Sales By GVW*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	45,880	17,492	3,606	17,735	3,658	4,890	3,224	96,167
February	39,373	16,210	3,207	15,686	3,973	5,572	3,180	87,141
March	45,598	18,841	3,719	19,446	4,473	5,496	3,614	101,177
April	43,167	18,023	3,786	18,996	4,146	5,264	3,382	96,723
Total—4 Mos. 1954	173,768	70,566	14,299	71,833	16,250	21,222	13,340	381,208
Total—4 Mos. 1953	213,891	90,593	19,429	73,605	19,042	35,380	17,372	469,222

*—Automobile Manufacturers Association.

AND AVIATION INDUSTRIES

1954 Predicted as an Epic Year in the History of the Automobile Industry

As the automobile industry approaches the halfway mark, it is becoming increasingly evident that 1954 is going to be a momentous year. There are many fronts on which new activity is occurring or is impending, and some of it may affect the pattern and the organization of the industry to a greater extent than in any single year for a long time, or perhaps in history.

More Shifting Due

There appears to be shaping up a behind-the-scenes movement which could alter the number and arrangement of manufacturers materially within the next year or two. Already four separate entities have been merged into two—Kaiser and Willys, and Hudson and Nash—and there is more than casual action toward bringing Studebaker and Packard together. Whether or not this will be successful is still open to conjecture, but there are logical reasons for such a development.

A current opinion among thoughtful watchers of the automotive scene is that, if the Studebaker-Packard deal does come off, it will lead eventually to further integration with American Motors, resulting in a Big Four. There also is some well-founded speculation that other companies, either in the automotive supplier industry or outside it, might be brought into the combination.

Sales Picture Good

For the industry as a whole, sales this year look quite satisfactory thus far. The overall picture, however, is misleading because, when broken down by individual companies, it is obvious that the two largest—Ford and General Motors—account for a major segment of the market. All other companies are down, and the independents particularly are finding the going very rough.

There is a noticeable trepidation about the period starting July 1, which marks the beginning of the end of the normal selling season. The market has improved in the spring and early summer months, but not to the point that had been expected. Nonetheless, the industry is only about six per cent behind a year ago in sales.

Output at High Level

Production has remained at a high rate and has caused some uneasiness because of the large stock of new cars in dealer inventories which overshadow the market. Dealers generally complain that, even though they are moving a satisfactory volume of cars, their profits have been severely curtailed by over-allowances and discounts brought on by the intense competition.

Certainly, at no time since the mid-30's, has the dealer body as a whole been so restless and dissatisfied. There is increasing undercover talk of a rebellion against factory inducements to take more automobiles than the dealer actually wants.

Freight Charge Problems

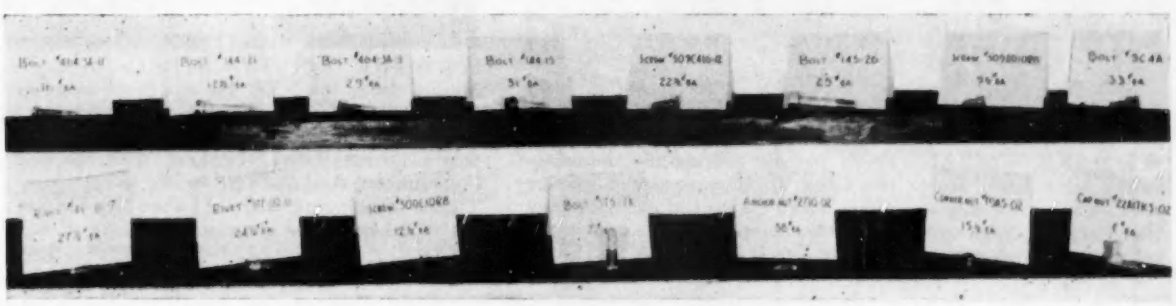
There is some evidence that automobile dealers may stir up quite a fuss over new car freight rate differentials based on f.o.b. Detroit pricing practices. Dealers at points remote from Detroit claim that freight charges from Detroit, even though the car might be built in a local assembly plant, artificially hike the price, thus creating sales problems and making it easy for bootleggers to import competition.

NADA apparently is ready to jump in with a demand for uniform freight charges throughout the country. Manufacturers certainly will oppose such a demand on the basis of cost of establishing assembly plants at distant points and shipping materials to them.

Dealer-Factory Relations

Relations of factories with dealers also are going to come in for some attempted legislation at both the State and Federal levels. NADA, in an effort to combat bootlegging of new cars, is trying to get from the Justice Dept. a "railroad release."

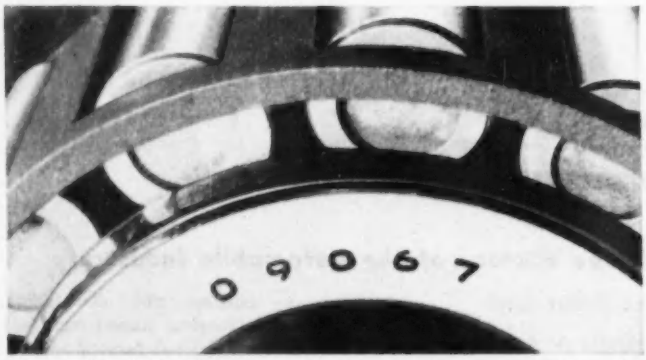
(*Turn to page* 114, *please*)



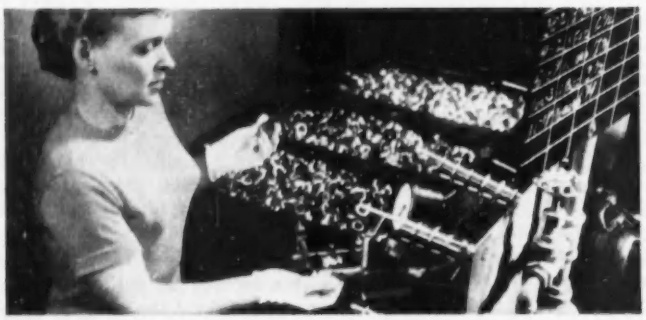
SMALL PARTS MAKE WORKERS COST-CONSCIOUS

Set up by Kaiser Metal Products, Inc., to impress upon its employees the high cost of aircraft fasteners, this price tag display makes its point in graphic fashion. The company reports that material conservation has been greatly improved through use of this device.

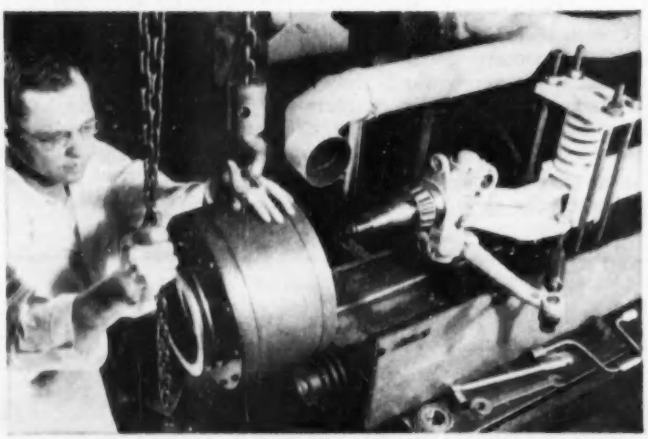
The number with a history



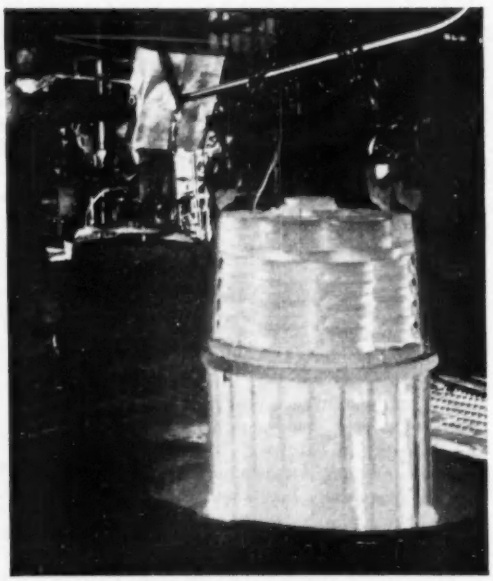
09067 ON THIS BEARING CONE, together with 09195 on the cup, tells you it's a certain-size tapered roller bearing commonly used on front wheels. But since this bearing also has the trademark "Timken®" stamped on it, a history goes with the number—of the quality and service that go with the bearing.



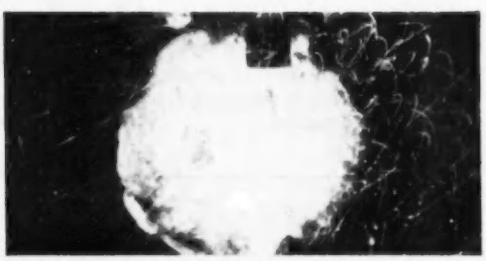
SHE'S CLOSING IN ON PERFECTION. This machine measures to a quarter thousandth. She uses it to sort Timken bearing cones of the same size into *sub-sizes*. Cones are then matched with rollers which have also been sub-sized. Result: Overall width of assembled bearings is kept uniform.



WE MAKE SPECIAL TESTS to help automobile manufacturers solve basic design problems. In this simulated service test, we run front-axle assemblies under maximum loads. It tests the bearings under operating loads, compares seals and lubricants, shows customers how to get longer bearing life.



WE CASE-HARDEN EVERY RACE AND ROLLER in the world's largest battery of case-carburizing furnaces. We make bearing parts hard on the outside to resist wear, tough on the inside to take shock. It's another reason Timken bearings are number-one for value in your car's moving parts—the vital zone.



WE MAKE OUR OWN STEEL—to control quality from the start. Shown here: a sample for lab analysis. No other bearing company in the U.S.A. makes its own steel. It's another reason for specifying "Timken" with the bearing number. And for *full* value, always use a Timken bearing cup with a Timken bearing cone. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN is number 1 for **VALUE** where value counts most... in the vital zone

TRADE-MARK REG. U. S. PAT. OFF.

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ↓ AND THRUST →← LOADS OR ANY COMBINATION

Men in the News

Threadwell Tap & Die Co.—Paul W. Polk was elected president.

Henry & Wright Div., Emhart Mfg. Co.—**W. S. Renier** is now general sales manager.

Ford Motor Co., Special Product Div.—**Ben D. Mills** is now assistant general manager.

Curtiss-Wright Corp., Metal Processing Div.—**Ralph T. D. Montagu** has been made sales manager.

Continental Aviation & Engineering Corp.—**John W. Carson** has been appointed quality control manager for the Manufacturing and Research Divs.

Houdaille-Hershey Corp.—**Virgil P. Burgess** has joined the firm as comptroller.

Borg-Warner Corp. — **John H. Schultz** has been elected an assistant secretary.

Chevrolet Motor Div., General Motors Corp.—**Carl W. Klein** has been appointed purchasing agent for the Toledo Div.

Mather Spring Co.—**Edwin R. Kirk** was made assistant chief engineer, and **Richard E. Hanslip** was chosen production design engineer.

Hart Mfg. Co.—**John F. Dreier** has been elected vice-president in charge of sales.

Bingham-Herbrand Corp. — **Turner A. McMullen** has been appointed vice-president and general manager of the Herbrand and Aviation Divs.

R. M. Hollingshead Corp.—**Philip Jones** has been elected secretary and assistant to the president.

Standard Pressed Steel Co., Finishing Div.—Walter W. Hambrecht has been made manager.

Lindberg Engineering Co.—R. A. Hastings (left) has joined the firm to head up the Sales Dept. of a new division, details of which will be announced later, and L. H. Remiker has been named head of the new Field-erected Equipment Div.

Minnesota Mining & Mfg. Co., International Div.—**Kenneth J. Shea** was elected vice-president of sales, and **Edward R. Newcomb** was chosen vice-president of export sales.

Hydropress, Inc., Rolling Mill Div. —**Hermann A. Bottenhorn** was elected vice-president.

Bassick Co.—**Michael Kramcsak, Jr.,** was named chief of engineering.

Vickers, Inc., El Segundo Div.—Edward I. Brown was made chief aircraft products engineer.

American Cyanamid Co., Industrial Chemicals Div.—**James B. Hatch** joined the Metal Chemicals Dept.

Solar Aircraft Co.—**Rankin H. McDaniel** was made general production superintendent in the Manufacturing Div; **L. C. Rothchild,** assistant general production superintendent, and **C. F. Grantham** production superintendent of Bldg. 13 at the San Diego plant.

Chrysler Corp., Export Div.—Robert D. Stoup has been appointed executive assistant to the president.

AP Parts Corp.—Norton J. Osborn has been named chief engineer.

Northrop Aircraft, Inc.—**Whitley C. Collins** was elected president and chief executive officer.

(*Turn to page* 111, *please*)

Necrology

S. Frank Baker, 58, president of Detroit Automotive Products Corp., died May 17, at Detroit, Mich.

Lloyd D. McDonald, 60, executive vice-president of Warner & Swasey Co., died May 15 at Shaker Heights, O.

Oliver P. Echols, 62, president of Northrop Aircraft, Inc., died recently, at Santa Monica, Calif.

Henry D. Sharpe, 81, president of Brown & Sharpe Manufacturing Co., died May 17, at Providence, R. I.

Meyer Botwinik, 51, vice-president and secretary of Botwinik Bros., died May 20, at New Haven, Conn.

Arthur H. Hemeker, 47, farm industries manager for General Electric Co., died May 22, at Manhattan, Kans.

Charles H. Kindelberger, Sr., 54, executive assistant to the president of North American Aviation, Inc., died recently, at Los Angeles, Calif.

Jacob Becker, 84, president of J. Becker & Sons Truck and Body Builders, died May 16 at Albany, N. Y.

James M. E. Walsh, 67, former treasurer and general manager of *Ward's Automotive Reports,* died May 11, at Highland Park, Mich.

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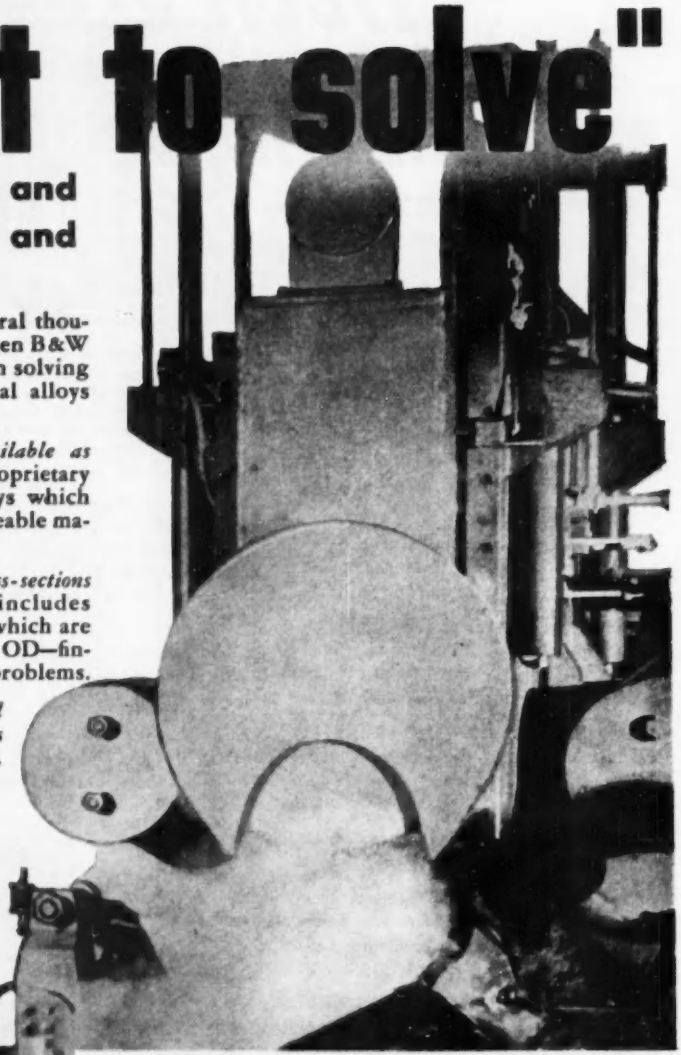
2. *Tubing having certain special shaped cross-sections has been produced commercially.* This includes tubing having inside and outside shapes which are independent of each other, such as circular OD—finned—ID, used to solve special heat transfer problems.
3. *Solids having special shaped cross-sections have been produced.* These include shapes difficult or impossible to produce as rolled sections.



Through extrusion, Mr. Tubes, your local B&W Tubing Representative, has helped others to solve problems involving tubing and solids of special materials and cross-sections. Call on him if you have such problems; chances are he will be able to help you.

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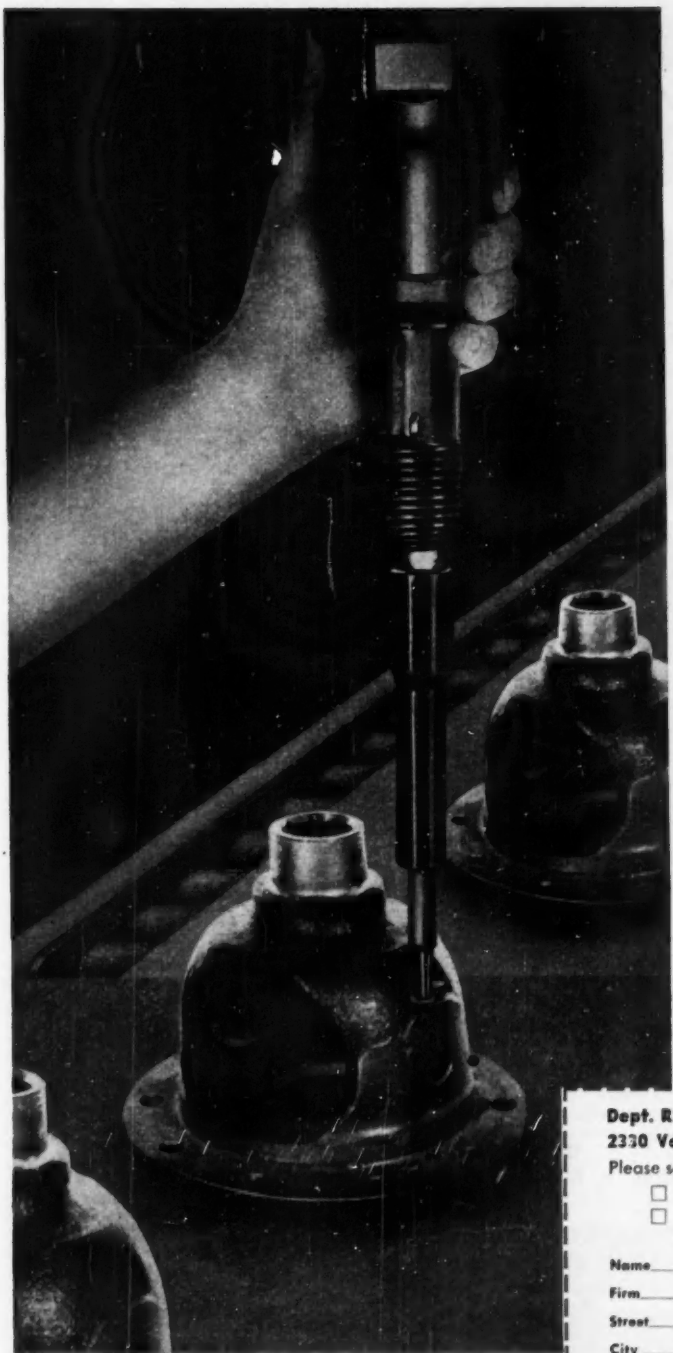
B&W SEAMLESS and WELDED TUBES

Ford Cuts Assembly Costs using

ROLLPIN TRADE MARK



*Rollpins applied as differential pinion pin lockpin on the Ford Motor Mound Road Plant assembly line.

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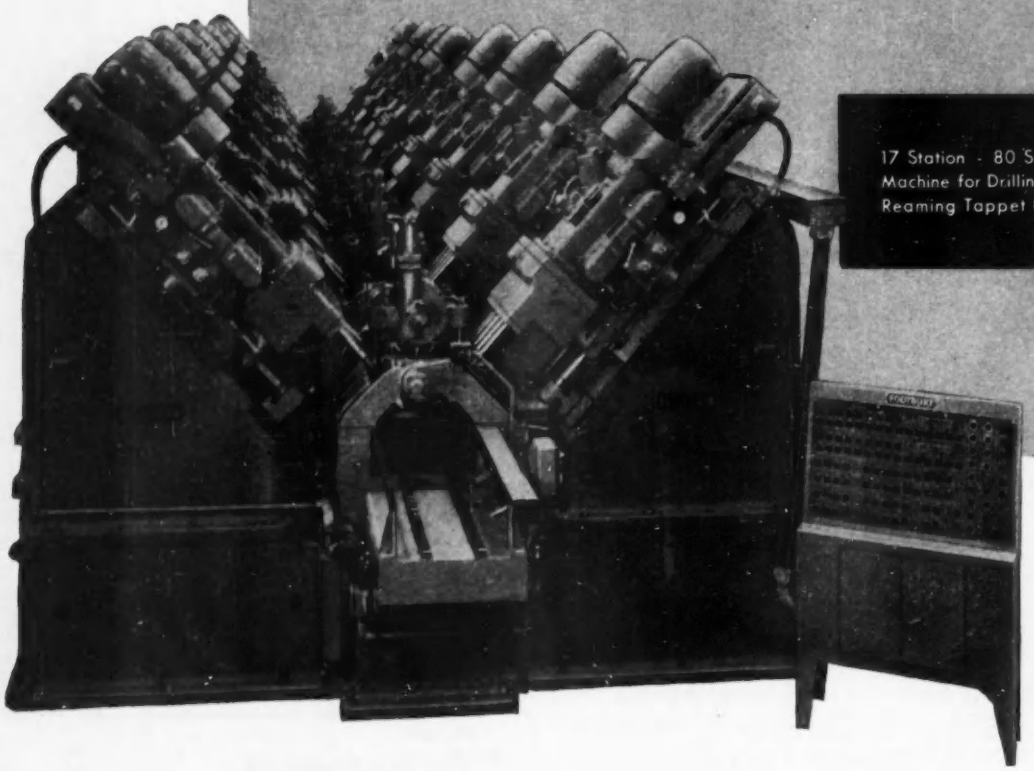

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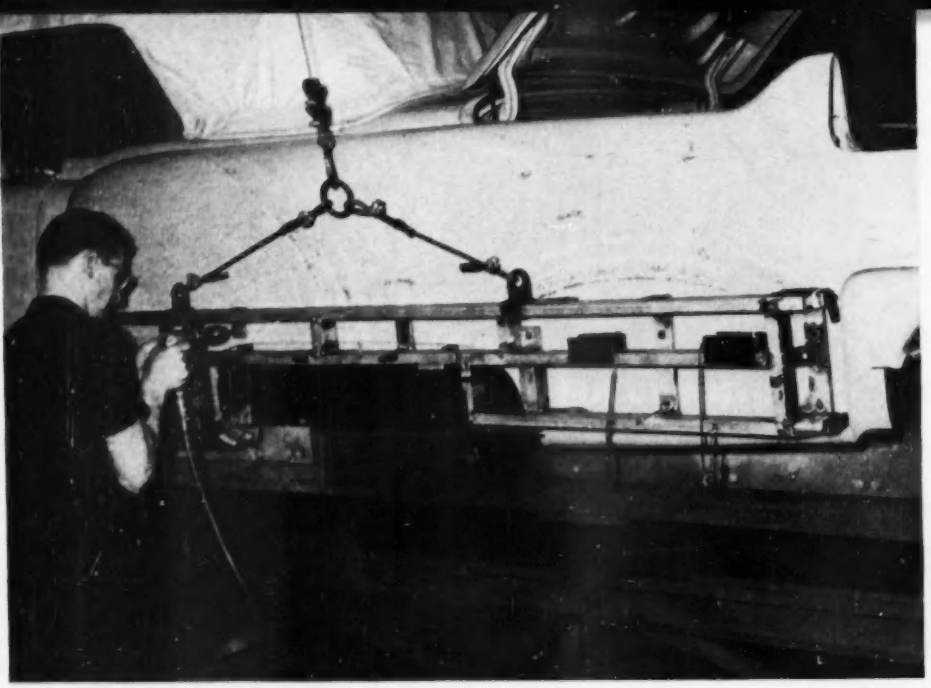
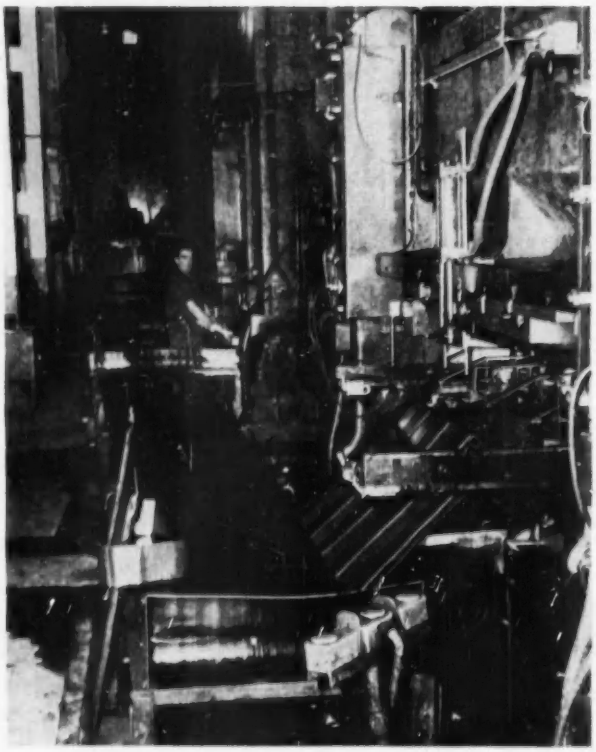


Extruded aluminum skirting on the 1954 Eldorado is specially fitted while the body is mounted on the special fixture. Locating holes are drilled with the aid of the unique jig as shown.

Complex Grille Unitized



Rear of the Minster press for producing the slender horizontal fins. Individual fins are wiped off the automation mechanism above the die and dropped onto the belt conveyor, seen at the left, for transport to the next operation.

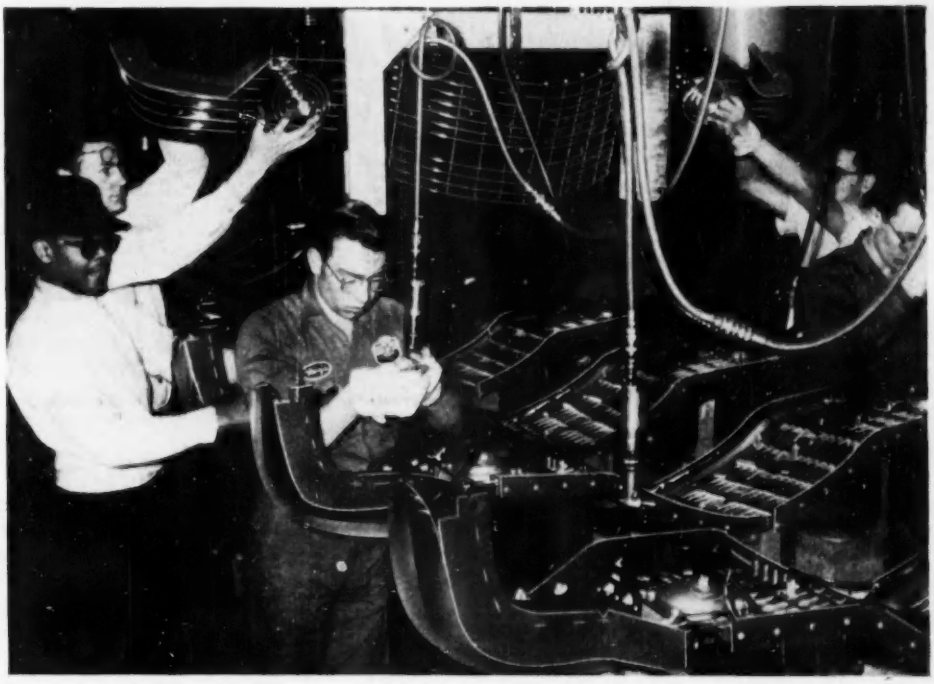
THAT distinctive stainless steel grille and massive front bumper found on Cadillac cars is actually an integral sub-assembly, installed as a unit on the final car assembly line.

The grille is composed of 21 vertical fin sections which are assembled with a group of ten horizontal fins, all of the sections being made of stainless steel. Vertical fins are produced from strip stock fed automatically through a progressive die in a small press. The fin is punched and formed into U-shape in this operation.

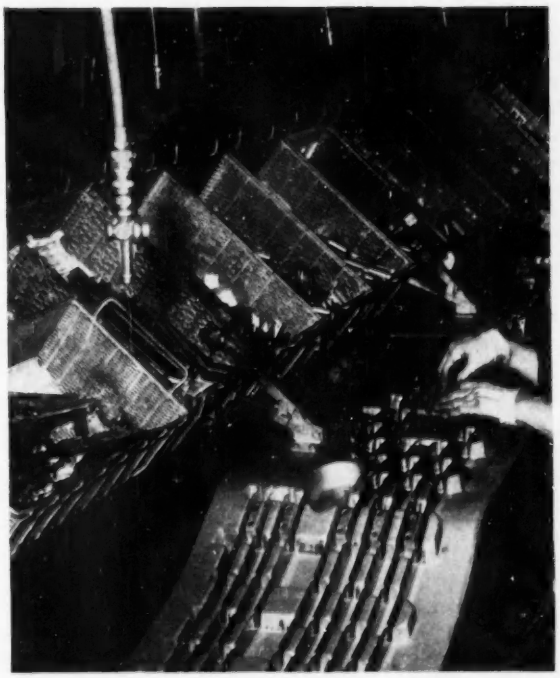
The long horizontal fins require considerably more work in the press shop, and incorporate some interesting automation details to facilitate the handling of these slender pieces. For this operation, a stainless steel blank is presented to a 300-ton Minster mechanical press fitted with a two-station die to complete the stamping in two stages. A unique feature of this press is the provision of an automatically shuttling carriage which performs the function of automation.

As the first operation is completed, the slender fin is lifted off the die by means of air cylinders, picked up by the carriage and dropped into the second station. Meanwhile, the fin just completed at the second station is lifted by air cylinders and carried out on the carriage. As the carriage moves outside the press bed, the fin is removed by means of two wiper blades and drops onto a belt conveyor for transport to the next operation.

It is noteworthy that this cycle of automation



A portion of the bumper assembly line may be seen in this view. The grille assembly comes in an overhead conveyor which crosses the bumper line at this point, facilitating the assembly of the grille to the front bumper.



Start of grille assembly on the merry-go-round line. Fins, stored in the bins in the background, are set by hand in the plastic-faced jigs.

View of one side of the merry-go-round assembly line. In the areas seen here the vertical fins are hand-hammered into place by the operators.

requires the application of 15 limit switches.

The front bumper, composed of four major sections, is formed in the press shop from ⅛-in. NAX steel, producing a bumper that not only looks massive but is as strong and rigid as its appearance suggests.

Assembly operations are quite distinctive and are divided into three major stages to produce an integral bumper and grille unit. The first stage is grille assembly along a merry-go-round conveyor line, using plastic-faced fixtures. To initiate the assembly,

(*Turn to page* 90, *please*)

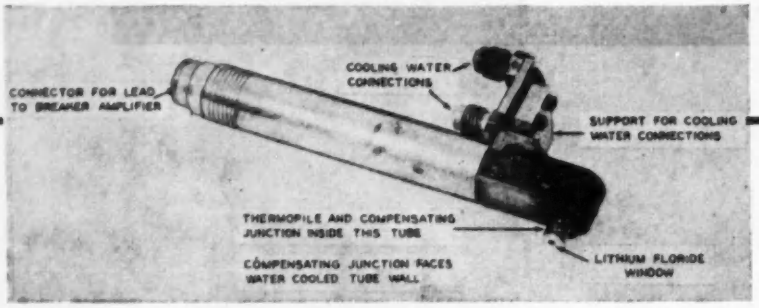


FIG. 1—Pyrometer design used to obtain the data presented in this article.

Unusual Temperatures in Brake Drums

BRAKE drum temperature measurement has long been a controversial subject. One reason for this has been the inability to measure accurately the surface temperature at the point where the rubbing takes place and the heat is generated. Since the deterioration of brake linings is a function of the temperatures to which they are subjected, it is desiderable to be able to determine the maximum temperatures generated at the area of contact between the brake lining and the brake drum.

When using a thermocouple for brake temperature it is common practice to percussion weld a thermocouple to the flat bottom of a hole which stops about 0.030 in. from the rubbing surface and use a potentiometer to measure the thermocouple output directly in degrees F. By this method only the general temperature of the brake drum section is measured.

The radiation pyrometer used for the work reported here was designed around a thermopile which intercepts a small fraction of the radiation from the brake drum and converts this energy into a measurable electrical signal. By directing the pyrometer at a spot on the drum surface immediately following the brake shoe, the surface temperatures generated at the rubbing surface can be measured with considerable accuracy.

This work was done with the brake assembly driven by a brake dynamometer. Since the thermopile is very delicate, and requires a relatively large amount of auxiliary apparatus, its application to road tests did not seem practical.

The final pyrometer design used to obtain the data presented here is shown in Fig. 1. Some important factors considered in the design and construction of this pyrometer were as follows:

1. The window opening for the thermopile was close to the brake drum surface so as to collect heat radiation only from the desired area.

2. Recirculating water cooling of the thermopile case was necessary to minimize the surrounding temperature effects on the thermopile case.

3. Series compensation of the thermopile served to stabilize the instrument zero. The compensating junction consisted of a thermopile similar to the working thermopile, but electrically connected so as to oppose the working thermopile. Since the compensating junction is located to receive heat energy only from the thermopile case wall, it served to counteract the errors which might be introduced by changes in temperature of the thermopile case. The working thermopile "looks" at portions of the thermopile case tip as well as the brake drum surface, consequently the water cooling and the compensating junction are necessary to neutralize heat changes except those coming from

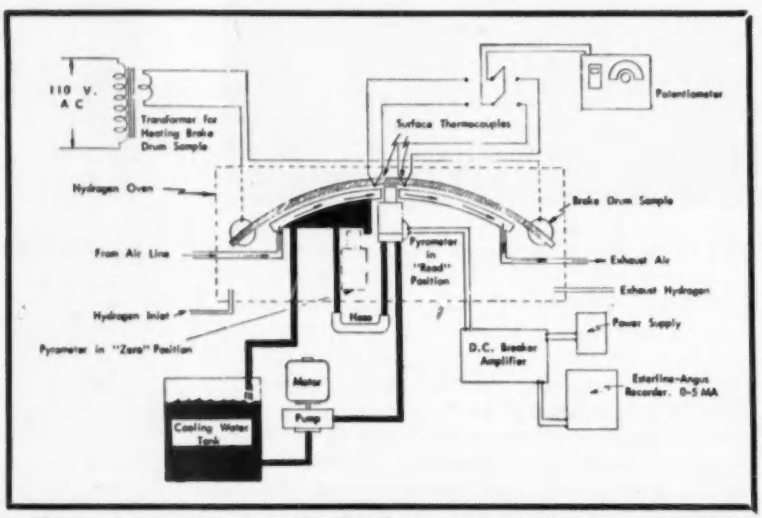


FIG. 2—Schematic layout of calibrating oven for brake drum pyrometer.

By

E. J. Martin and J. E. Wilson

Research Laboratories Division, General Motors Corp.

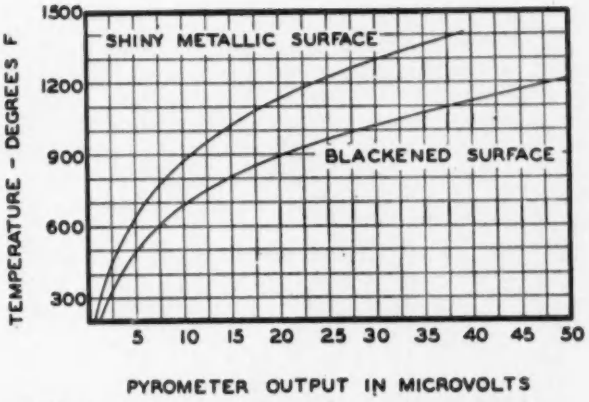


FIG. 3—Calibration of brake drum surface pyrometer.

the desired portion of the brake drum surface.

Because the output from a small thermopile is only a few microvolts, a contact modulated d-c amplifier developed in the G. M. Research Laboratories was used to provide sufficient output to operate a 0-5 ma recorder.

The usual procedure was to run the tests on the brake dynamometer, then machine a calibrating sample from the used brake drum and thus calibrate the pyrometer against the actual test surface.

The radiation pyrometer was calibrated by directing it toward the sample of brake drum surface which was at a known temperature, and recording the output voltage. The brake drum sample was heated by connecting it to a 60 cycle welding transformer with Variac control. Fine wire thermocouples welded to the sample brake drum surface and connected to a potentiometer provided the known temperatures. The range selected for calibration was 300F to 1500F. Enough points were obtained to give a good curve.

In order to prevent oxidation and tarnish of the highly polished surface produced by the rubbing action of the brake shoe during the dynamometer runs, all calibrating was done in an atmosphere of dry hydrogen.

The schematic layout for the hydrogen atmosphere calibrating oven is shown in Fig. 2. Notice that a pyrometer is shown in two positions, i.e., a "read" position, and a "zero" position. If the pyrometer were left in the "read" position for more than 15-20 seconds time, the pyrometer window and tip would warm up more than other parts of the pyrometer case, and this would change the temperature of the compensating junction and cause zero drift in the instrument.

For this reason the "zero" position was provided in the calibrating oven. In the "zero" position the pyrometer was looking at a surface which was stable as to temperature and emission and served as a checking point between calibration readings. The pyrometer was quickly shifted from one position to the other by a guided rod underneath the oven. *(Continued)*

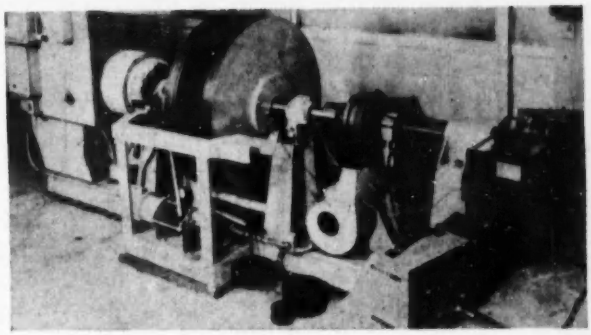


FIG. 4—Inertia type brake dynamometer used for brake drum surface temperature tests.

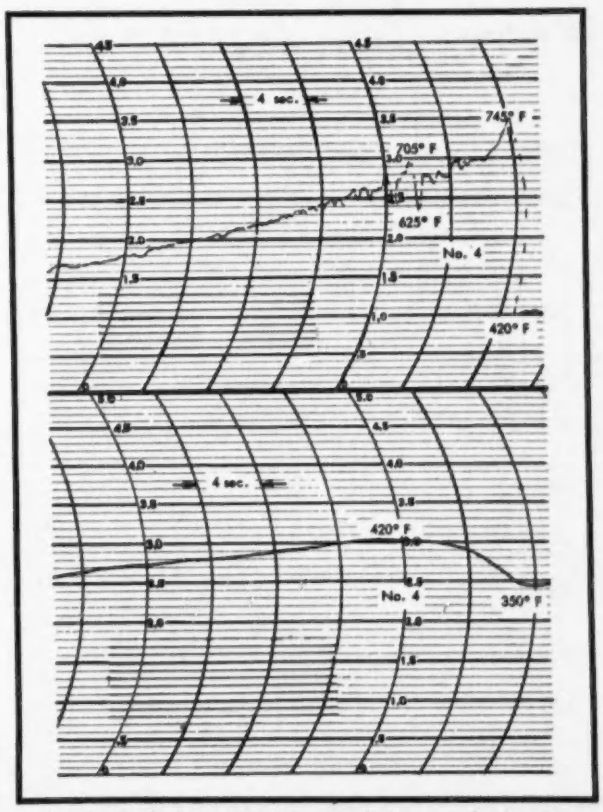


FIG. 5—Typical record of temperatures on a brake stop.

When calibrating the pyrometer, the points were taken as the temperature was varied up and down in steps through the selected range. If the points on the "down" curve fell on the "up" curve, there was no change of the sample surface due to heating. If the surface had oxidized during the test, the points on the "down" curve fell below the "up" curve.

The distance maintained between the pyrometer and the brake drum surface was not critical. When the distance between the pyrometer window and brake drum surface was changed 3/64 in., there was a slight difference between the two curves below 900F; but they were identical above 900 F.

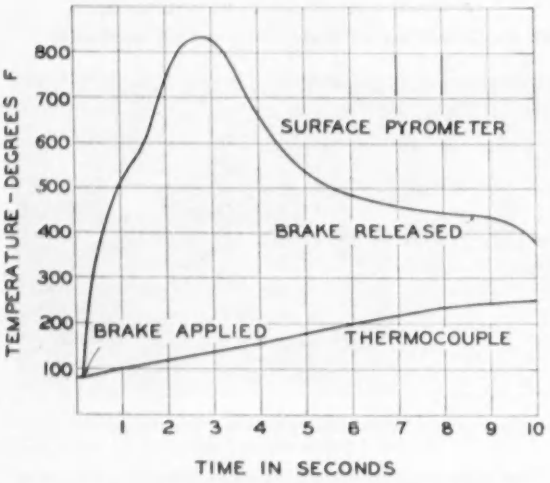


FIG. 6—Temperature vs time curve, 840 rpm (70 mph), 55 lb pedal pressure.

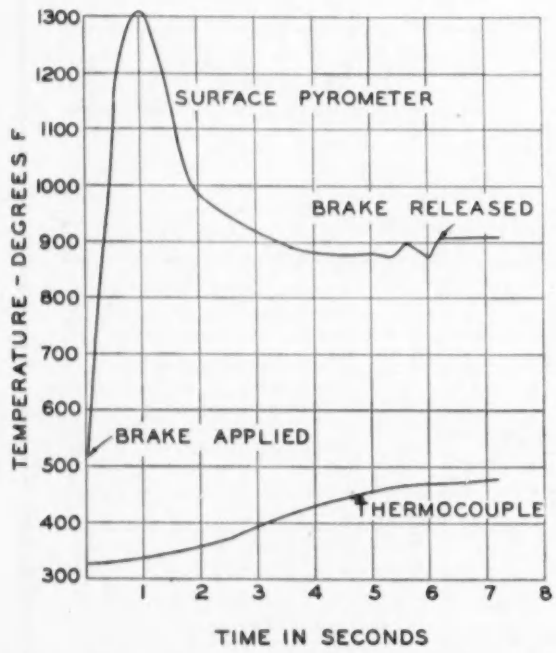


FIG. 7—Temperature vs time, 840 rpm (70 mph), 55 lb pedal pressure. Brake drum was hot from previous stops.

On the brake dynamometer, the surface of the brake drum depends on the type of stops. For moderate stops the surface is shiny and metallic. Repeated stops from high speeds, (70 mph) and heavy pedal pressures, (55 lb and up) cause the surface to become blackened. This blackening changes the emissivity of the surface. Since the pryometer measures radiation which is a function of emissivity, this blackening has an effect on the pyrometer output and the temperature reading. It is necessary to calibrate the pyrometer using a surface that is characteristic of the surface during the testing; or better yet, cut a sample from the brake drum surface after test runs have been made and use this to obtain calibration curves for the particular test. This gives the most accurate results. Typical calibration curves for a shiny surface and blackened surface show in Fig. 3.

It was found that this pyrometer-amplifier-recorder combination had a time lag of less than ½ sec, and under severe braking stops there was a slight zero position drift. In order to improve either of these conditions, it would have been necessary to redesign both the pyrometer case and thermopile, and since this was an exploratory instrument application, these expensive and time-consuming changes were not undertaken at that time. In any case, these difficulties mentioned above were such as to make the recorded temperatures read a little lower than the actual peak temperatures produced.

The inertia type brake dynamometer used for the brake drum surface temperature tests is shown in Fig. 4. The dynamometer was run on a repeating cycle, i.e., power was applied and the flywheel brought up to speed, the brake was applied, and power was reapplied as soon as the brake released.

The temperature measuring instrumentation also is shown in Fig. 4. Two amplifiers and two recorders were used to record the temperatures of the brake drum. One amplifier-recorder circuit was connected to a thermocouple placed 0.03 in. below the surface, and the other to the surface temperature pyrometer.

A regular thermocouple potentiometer was used to calibrate the thermocouple temperature recorder. This was done by making several stops so as to heat up the brake drum, and reading the recorder deflection for various temperatures as measured with the potentiometer. This made it possible to compare the data obtained during these tests with that accumulated over the years from thermocouple temperature measurements since the thermocouple potentiometer has been widely used for this purpose.

Before any test runs are made, it is important to wear in the brake linings so they are making good contact with the brake drum at all points.

Brake stops made from 40 mph and at 35 lb pedal pressure can be considered normal for most driving conditions. With the brake dynamometer set up for these conditions, surface temperatures were recorded for a series of such stops. A typical record of the

temperatures on one of these stops is shown in Fig. 5. It can be seen that the surface temperature was about double the temperature recorded by the thermocouple under these test conditions.

It should be noted in Fig. 5 that there was a cyclic temperature variation indicated by the surface pyrometer. Note that on the pyrometer chart (upper) that the drum stopped and the brake released at about the point where the pyrometer temperature dropped sharply to 625F. The cyclic variations at this point were the slowest and increased in frequency as the brake drum again picked up speed. This indicates that there were temperature differences around the circumference of the brake drum surface; and in many cases these differences were as much as 200F-300F.

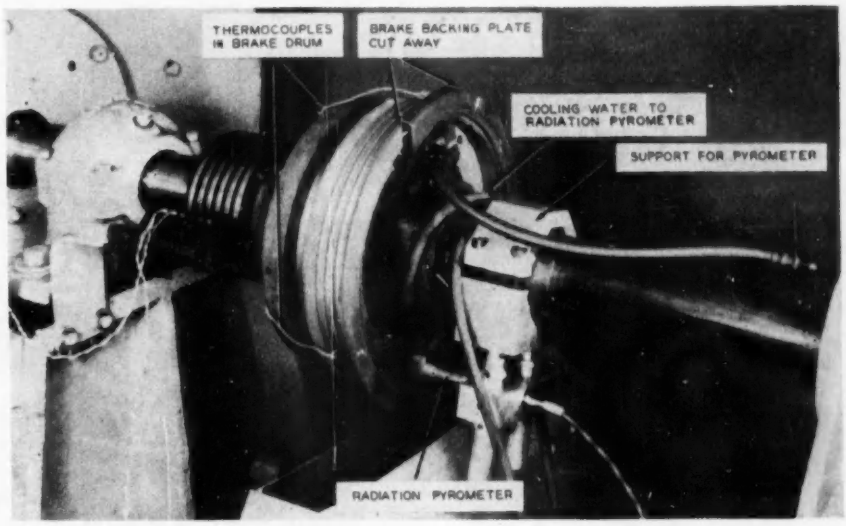


FIG. 8—This illustration of testing setup shows location of pyrometer relative to the brake shoe.

Records from one of a series of stops made under more severe conditions using 55 lb brake pedal pressure and stops from 70 mph are plotted on rectangular coordinates in Fig. 6. At the beginning of this stop the brake drum was at room temperature, but during the stop the surface temperature reached three to four times the maximum recorded by the thermocouple. Note that after 2½ sec the surface temperature was approximately seven times the drum thermocouple reading. Also note how the surface temperature dropped as soon as the brake was released, but the drum thermocouple temperature continued to rise *after* the brake was released.

After several stops from 70 mph the brake drum became hot. The records of one stop with a hot brake drum are plotted in Fig. 7. Here the surface temperature reached two to three times the maximum thermocouple temperature, and showed a peak temperature of more than 1300F.

On some occasions under severe conditions the brake lining became so hot that fire and sparks showered out from the trailing end of the forward brake shoe. When this fire from the brake shoe passed under the pyrometer it caused the pyrometer temperature recorder to instantly climb off scale, and remain there until the fire trail moved away from the pyrometer field of view.

The highest surface temperature measured with the pyrometer during the various tests was about 1400F which was maximum deflection on the pyrometer temperature recording instrument. Probably surface temperatures exceed this figure on many occasions.

One limitation to using the pyrometer for surface temperature measurements was the change in the surface characteristics. If surface temperatures did not exceed 800F to 1000F, the brake drum surface remained shiny and clean. Higher temperatures caused the surface of the brake drum to become blackened. The pyrometer calibration changed when the surface became darker; therefore, the pyrometer output had to be interpreted using the calibration curve corresponding to the type of surface encountered, see Fig. 3. It usually requires 10 to 15 very severe stops (without dynamometer cooling fan) to produce appreciable blackening of the drum.

(*Turn to page 93, please*)

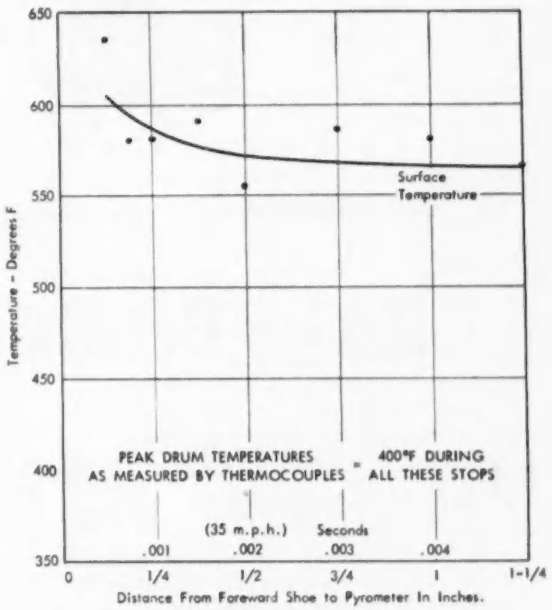
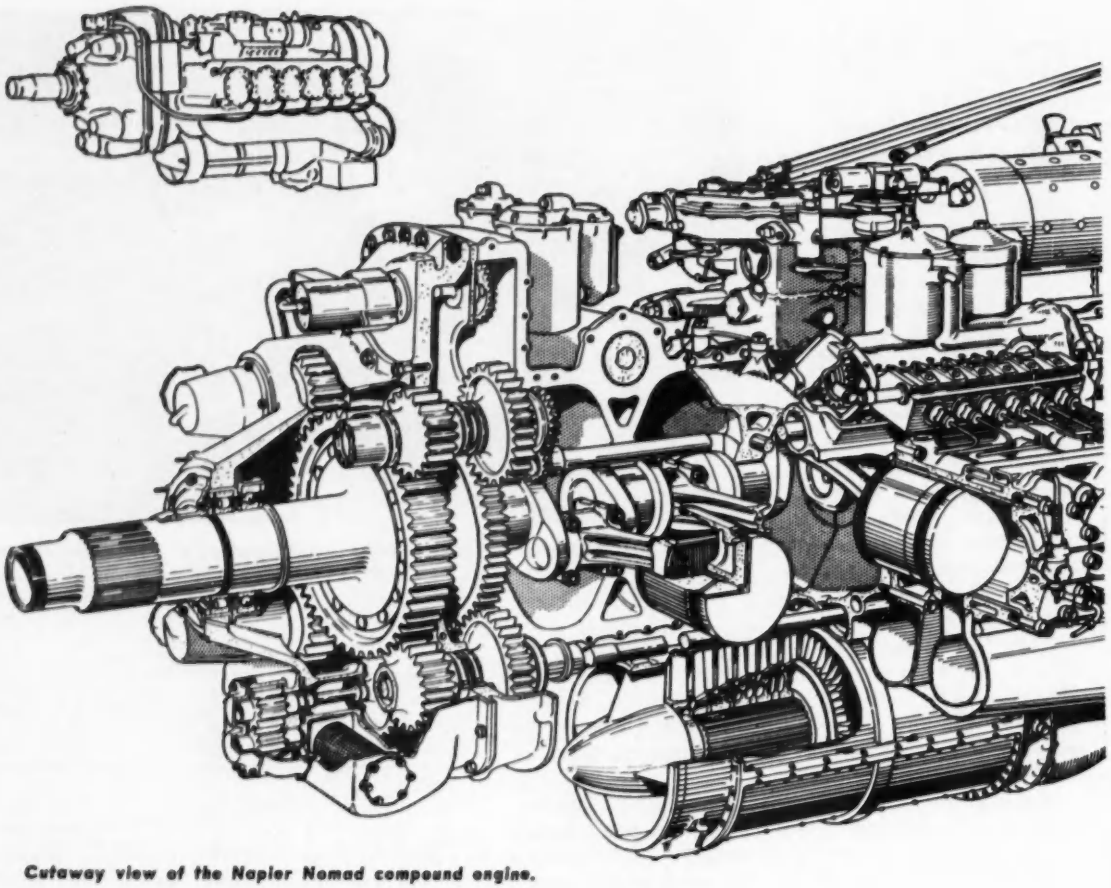


FIG. 9—Cooling rate of brake drum surface



Cutaway view of the Napier Nomad compound engine.

Design Details of the Napier Nomad

LONDON, ENGLAND

DETAILS of the Napier Nomad aero engine which have now been released by D. Napier & Son, Ltd., England, show a number of unusual design features in the first compound Diesel-gas turbine. The Diesel is a 12-cyl horizontally-opposed two-stroke unit of 2500 cu in. displacement. Bore is 6 in., stroke 7⅜ in., and compression ratio is 8 to 1.

The magnesium-zirconium alloy crankcase is split vertically to facilitate assembly. Cylinder blocks are aluminum alloy castings with inlet and exhaust ports machined in the dry liners. Hemispherical combustion chambers are formed in the cylinder heads, and two injection pumps are used.

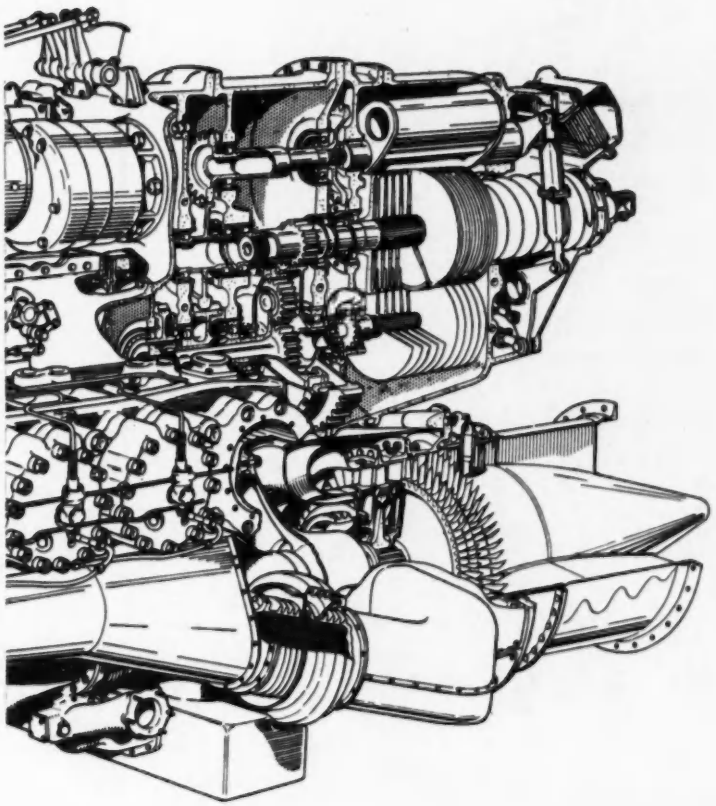
Pistons are in two sections, with an alloy body and crown and upper ring grooves of austenitic steel. Cooling oil reaches the area behind the piston gas rings through drilled holes in the connecting rods.

Small ends of the connecting rods are joined to the pistons by semi-cylindrical bearing surfaces. The unidirectional loading on the connecting rods, characteristic of two-stroke operation, necessitates only simple retaining clamps to maintain bearing contact under reverse loading. Opposite ends are paired on the six-throw crankshaft in a similar manner.

The compressor, suspended beneath the crankcase by flexible links, consists of 12 stages providing a maximum pressure ratio of 8¼ to 1 with an air mass flow of 13 lb per sec. Automatically-adjustable inlet guide vanes extend the operating range at low speeds to match turbine requirements.

The three-stage turbine is located coaxially behind the compressor and supported by a tubular frame bolted to the rear gear casing of the engine. The latter houses the main part of the turbine-Diesel reduction gear train, oil and coolant pumps, and drives for the 112-v starter motor and auxiliary gearbox.

Of particular interest is the infinitely-variable gear coupling between the turbine and Diesel engine. A set of disks with narrow flanged rims, stacked on a central shaft, mesh with three sets of tapered disks on radially-disposed shafts.



Compound Aircraft Engine

By David Scott

These three shafts are carried on swinging arms, controlled by a servo piston, which permit variations in mesh and hence ratio between the outer and inner disks. Each set of outer disks is geared to an output shaft concentric with the fulcrum of its individual swinging arm, thus effecting a constant-mesh gear system.

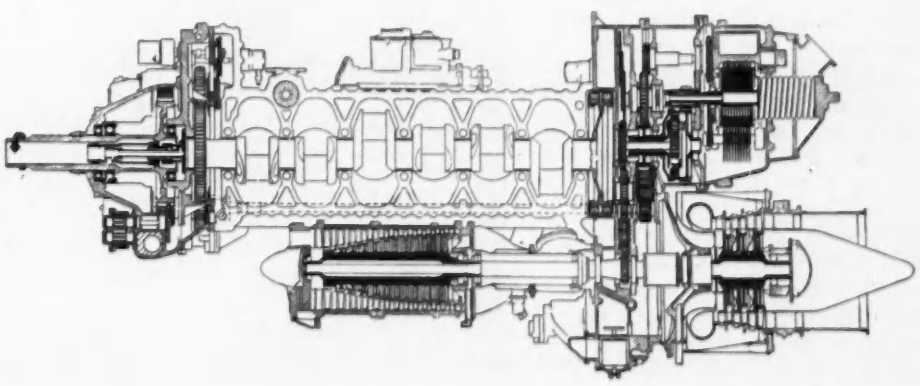
All four shafts are splined, and the disks on the central one are compressed by a coil spring against the interleaved outer disks. As the degree of mesh is increased, spacing between the disks widens as they spread out on their splined shafts. A film of oil is supplied under pressure at points of friction.

This variable-ratio coupling transmits only about 30 per cent of the total power. The greater part is handled by an epicyclic speed reduction gear train which parallels the disk unit, thus enabling the weight and dimensions of the latter to be kept to a minimum.

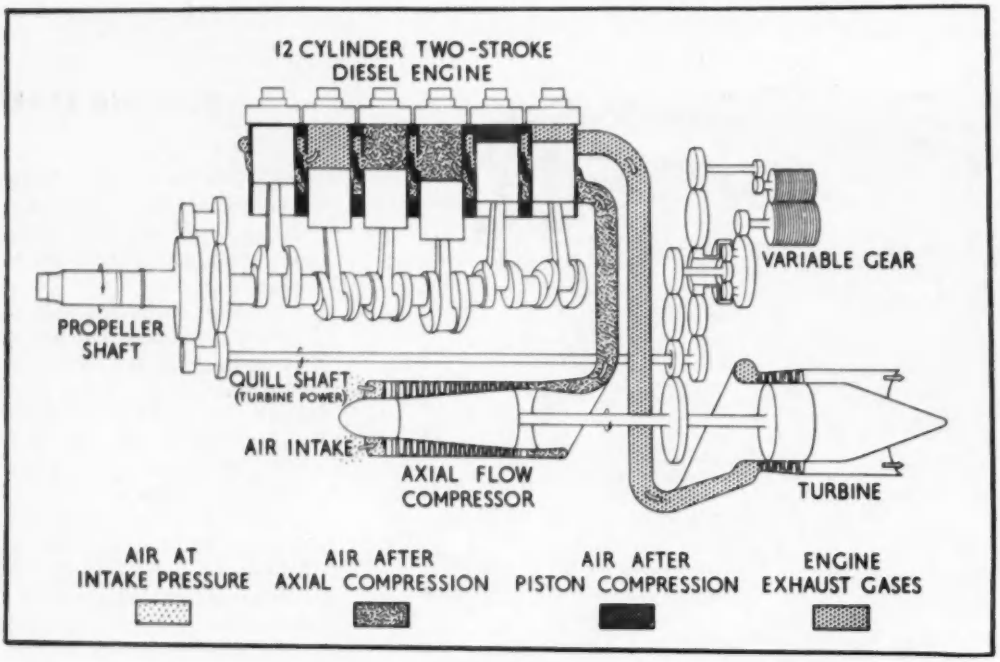
A single lever control coordinates engine speed, boost and fuel supply to follow a predetermined operating line. The servo piston of the variable datum boost-control unit actuates the gear ratio change mechanism which regulates the speed of the compressor. Boost pressure is raised as altitude increases until the maximum permitted speed of the turbine is reached.

This corresponds to the maximum power altitude for that particular engine condition. Above this point fuel flow is automatically reduced by a resetting device in proportion to falling boost. Substantially constant power can thus be maintained over a broad range of altitudes up to 25,000 ft.

The compound cycle of the Nomad engine permits



Longitudinal section through the engine assembly. Overall length is 119¼ in.



exceptionally high overall compression and expansion ratios, and results in unusually low fuel consumption. For example, Napier states that under take-off conditions at sea level compression ratio may reach 31.5 to 1 and expansion ratio 24 to 1, boost pressure being 89 psi (absolute).

Maximum take-off power at 2050 rpm is said to be 3135 equivalent hp, when the power-to-weight ratio is 1.17 lb per hp and fuel consumption 0.345 lb per ehp/hr. Additional power up to 4095 ehp may be obtained by injecting water into the engine manifolds, and by burning a small quantity of fuel in the exhaust manifold between the engine and turbine.

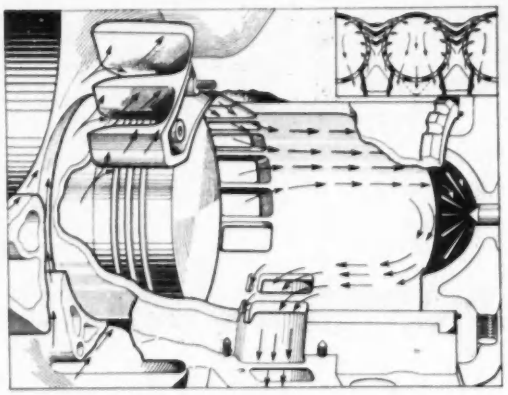
A variety of fuels may be used, including Diesel oil, kerosene and wide-cut gasoline. Weight of the Nomad is 3580 lb and overall length 119¼ in.

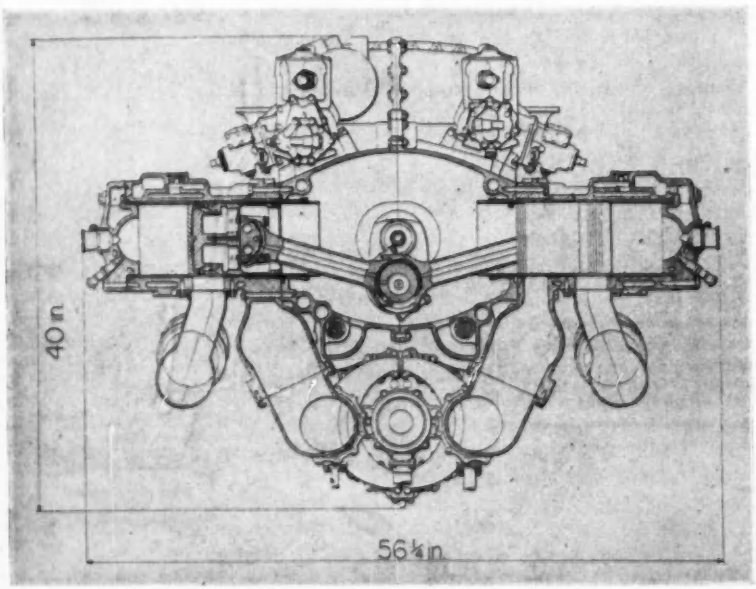
Economy of operation, maintained over a wide range of powers, altitudes and flight speeds, is the outstanding claim for this engine. It is seen as particularly applicable to air freighting. While not yet adopted by any aircraft manufacturer, the Nomad is soon to be flight tested in an Avro Shackleton coastal reconnaissance aircraft.

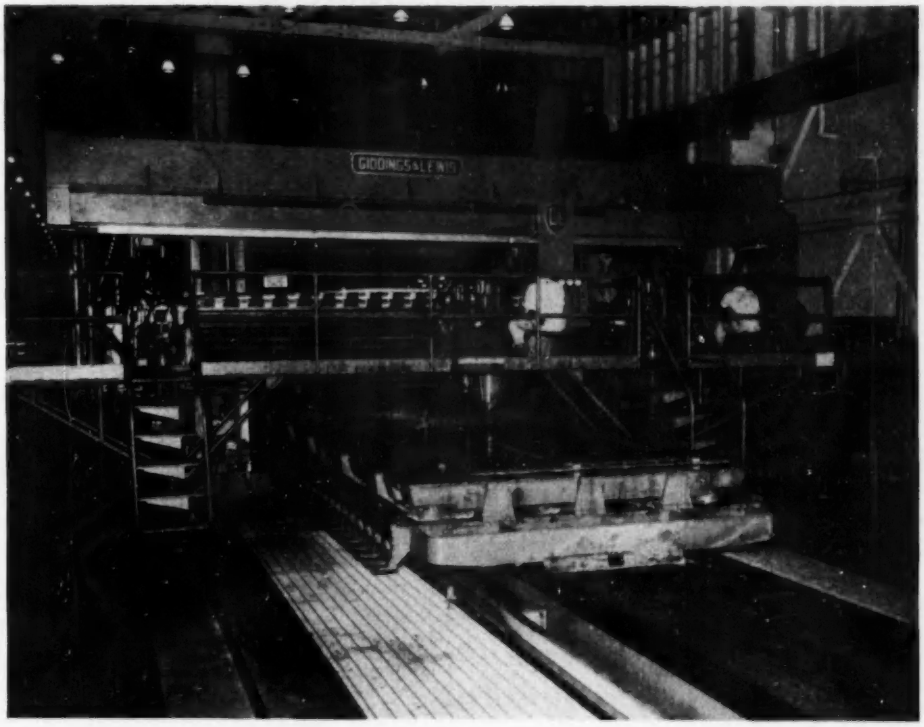
Schematic diagram of units and flow paths of gases in the engine.

The scavenging system is said to combine effective exhaust of burned gases with minimum pressure losses.

Transverse section of the engine showing details of connecting rods and pistons.







Operators of Douglas El Segundo's new combination spar and skin mill are able to straddle the machine's 40-ft work table through use of a portable bridge which also serves as a vantage point, placing them directly over cutter positions. In the foreground is the steel table which slides back and forth over the machine's 90-ft protected ways.

HUGE SPAR AND SKIN MILL

For Workpieces Up to 40 ft. by 10 ft.

THE world's largest combination spar and skin milling machine has begun operation at the El Segundo, Calif., Division of Douglas Aircraft Co., Inc. This new double-duty mill is one of a series of machines being acquired by Douglas El Segundo under the Naval Industrial Reserve Aircraft Program begun over two years ago.

Designated G&L Hypro 100, the machine tool was built to Douglas specifications by the Giddings and Lewis Machine Tool Co. It is 90 ft long by 30 ft wide and 26 ft in height.

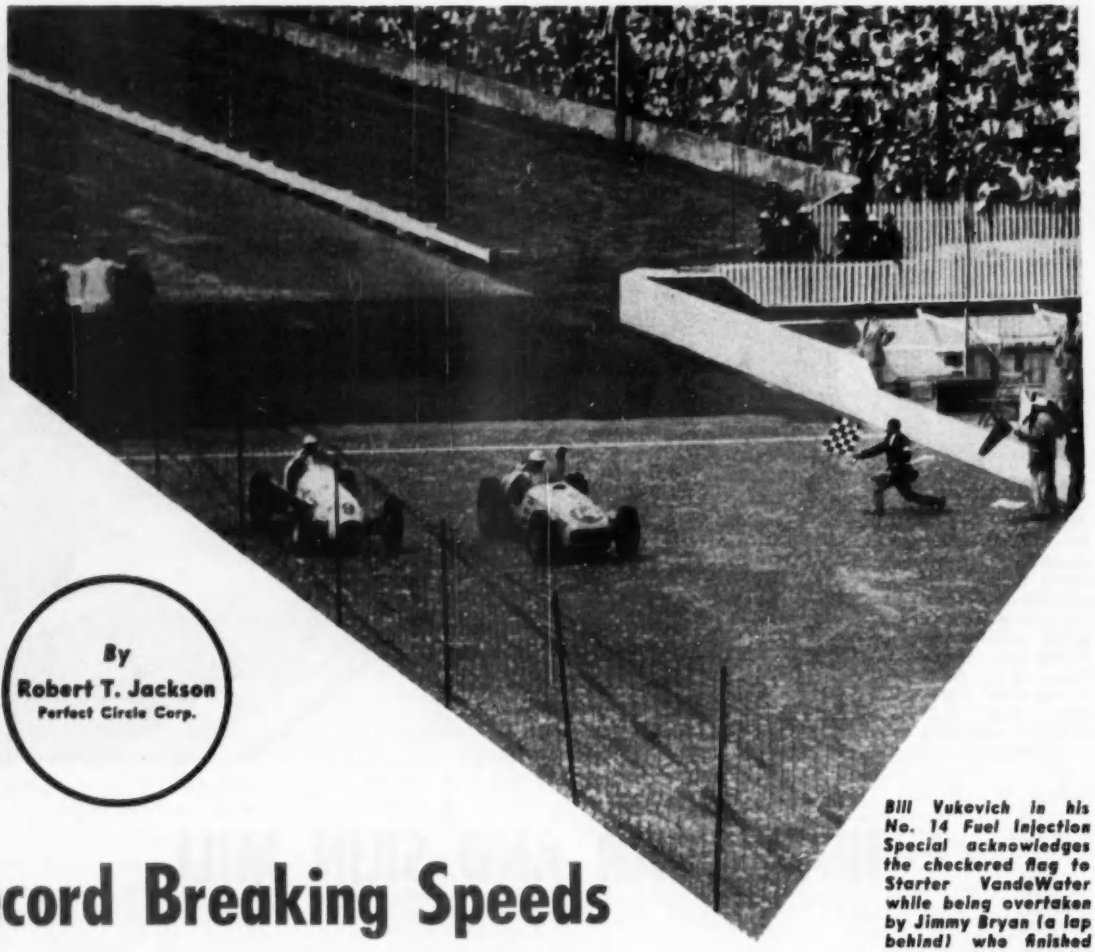
The new mill, weighing 250 tons, can handle thick aluminum plate 40 ft long by 10 ft wide. It is now in use fabricating sections of the Navy's F4D Skyray jet interceptor and new A3D Skywarrior twin jet bomber.

An outstanding feature is one of the machine's three Onsrud cutting heads which is automatically guided by a template or pattern. The pattern directs the cutter through the milling of an intricate airframe section at speeds as high as 7200 rpm. The other two heads have individual vertical rise and fall systems with quick change templates.

Work is placed on a 40-ft welded steel table which moves on rails at a speed of 150 ipm, beneath a portable catwalk which straddles it like a bridge. Two operators manipulate the General Electric push-button control boards which are located on the portable bridge or catwalk.

The spar and skin mill uses 12 drive motors totaling approximately 350 hp, exclusive of 18 motors and generators delivering the power supply. A 20 hp motor drives the work table and smaller motors move the cutting heads on their guide rails.

Metal chips routed out by the three cutting heads are carried away at a rate of 900 cu in. per min by cutting fluid gushing along either side of the moving work table.



By
Robert T. Jackson
Perfect Circle Corp.

Bill Vukovich in his No. 14 Fuel Injection Special acknowledges the checkered flag to Starter VandeWater while being overtaken by Jimmy Bryan (a lap behind) who finished second. Skid marks were left by Sam Hanks' car (Rathmann driving at the time) when engine locked.

Record Breaking Speeds at Indianapolis "500"

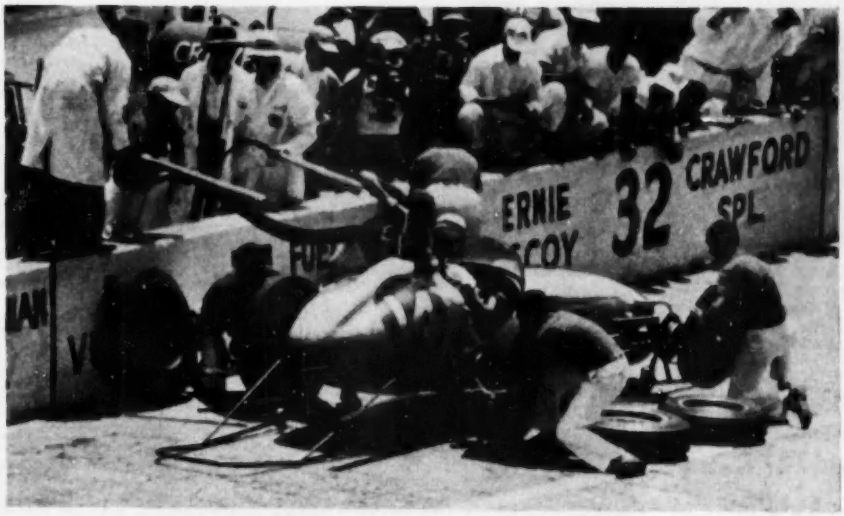
WHEN Bill Vukovich won the 500-mile race with a record-breaking average speed of 130.840 mph, he climaxed a day of competition which saw all course records for the distance broken again. Vukovich's victory was the second in a row for the Fresno, Cal., speed artist, and his car, the Fuel Injection Special owned by Howard Keck.

Contrasted with his conquest in 1953, however, Vukovich did not have everything his own way. Jack McGrath, starting from his pole position, promptly took charge of affairs, more or less closely harried by Jimmy Bryan and Johnny Thomson. Troy Ruttman came up after a few laps and forced the pace still more until he literally ran the tires off his car and was forced to make an early stop.

Meanwhile, Vukovich, from his starting position in the seventh row, had been steadily forging his way forward in effective, if not spectacular, style. Obviously in line with strategy developed in his pit as the race proceeded, Vukovich's gains were relentless rather than flashing. Soon he was running in fifth spot, content to let the leaders collect the lap money, attract most of the record crowd's attention—and rapidly wear off rubber.

Forty laps or so of the race flashed past in this fashion, with Jack McGrath outrunning his grim pursuers steadily while stacking up lap prizes and new records. The early part of the race was going at the terrific average of 137 plus mph but tires were going with it. The torrid pace he was pressing brought Jimmy Bryan in early for four tires and fuel. His crew made an heroic change of four tires and refueled for him in 41 seconds: On his 44th lap McGrath was in for new tires all around and fuel. He was out again in 45 seconds! Both Bryan and McGrath, in spite of their very fast pit stops, were dumped back into the grind below fifth position. Johnny Thomson made an early stop too, and a good one, because of the extravagant speeds demanded of and by the leaders.

All photographs by Robert T. Jackson. Material in this article was prepared by him exclusively for AUTOMOTIVE INDUSTRIES. The writer gratefully acknowledges information received from and cooperation extended by Messrs. Powell, Silberman, and Rodgers of the AAA Technical Committee, C. Rigsbee, Chief Timer and Scorer, and Paul Johnson, AAA Chief Observer.



Bill Vukovich in the pits for his first stop. All tires changed and refueled in less than 60 seconds.

Jimmy Bryan makes his third pit stop. His crew did valiant work for him throughout—all their stops were very smart.

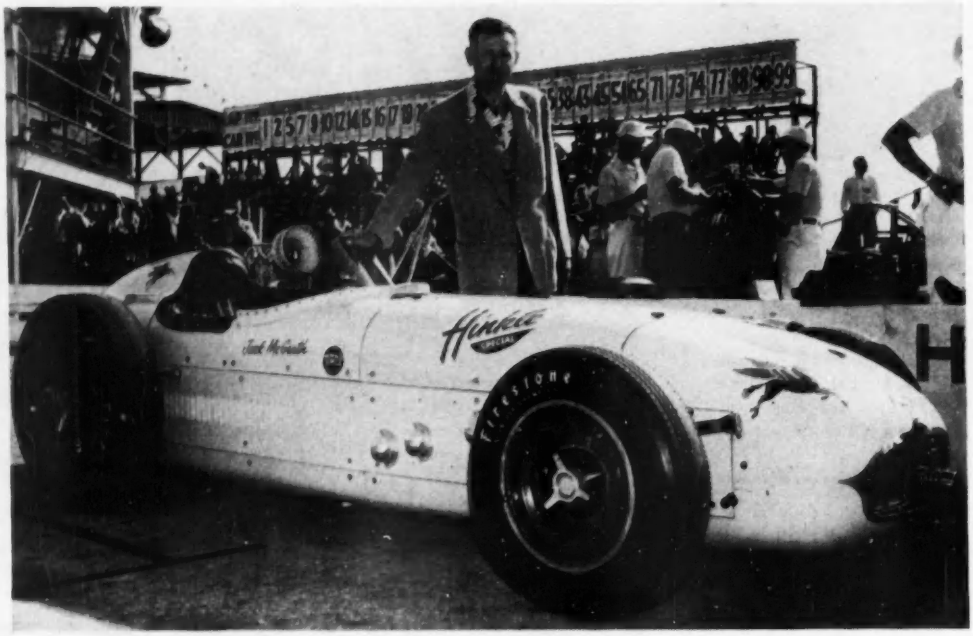
At this stage of the proceedings the lead was a temporary honor for several aspirants, among them Jimmy Daywalt. Art Cross came up and led a couple of laps but Daywalt snapped back into the lead briefly, only to be overtaken again by Cross. This duel continued until both made pit stops after 60 laps.

Here Vukovich, who apparently had been playing greyhound to the Daywalt-Cross rabbit act, having run third for a number of laps, received the lead as a legacy. It might be said that he disdained to hold it on this basis and made his own first pit stop soon after. This placed Jimmy Bryan in the lead which he then held for ten or fifteen laps, riding hard and rather obviously enjoying the whole thing.

Bryan, however, had to make his second stop about that time and McGrath, who had been steadily hauling himself back into the van since his first pit stop, once again took up the post of front-runner. His leadership was short-lived this time. Vukovich, once again passing them where he caught 'em, was putting on a great drive for the fresh air and in a few nerve-wracking laps of nose-to-tail maneuvering with the flying McGrath, the wiry little Slovenian finally slipped past and began to go for more distance in his own right. This was about halfway through the race.

From this point to the closing laps of the race the story can be written merely—*encore Vukovich*, even though Jimmy Bryan *did* lead again when Vukovich made his second (and last) pit stop. Bryan ran in front then for about twenty laps until his 149th lap at which time he came in for his third and last stop. Although Bryan's three stops were excellent—even amazing—averaging less than 45 seconds per stop—his last one put him back on the course valuable seconds in debt to Vukovich.

The latter then never relaxed this good hold on the forelock of time until he had a full lap on Bryan. McGrath suffered the excruciating misfortune of having his engine stall when he was pulling out of his pit after his second stop, at about 100 laps, which cost him *almost a minute* of time that may have made the difference between third and second at the end of the race. (*Continued on next page*)



Jack McGrath's 500C Kurtis qualified at 141.033 mph. Chassis builder Frank Kurtis posed beside the car.

So the story of the second half of the race was mostly Bryan and Vukovich. The story of the entire race was one of blistering speed—both on the course and in the pits. Records fell with abandon and regularity. Only marks not replaced were the one and two lap (1st and 2nd laps) figures. This probably was due to the admirable discretion with which the contestants observed the admonitions of officials regarding safety during the early turns of the course—evidently they wisely chose to let the mess get fairly well uncurdled before "charging."

Back to the Vukovich encore and the closing laps of the contest; his pit crew was giving him the "EZY" sign every lap of the last twenty (rather obviously with tires in mind and based on the two stop strategy) to the end that Jimmy Bryan picked up a little of the lap lead previously set forth. And so to the finish, with Bryan less than a minute to the rear and McGrath third. Our summary table will give the dry facts on all contestants who have not been mentioned in this chronicle.

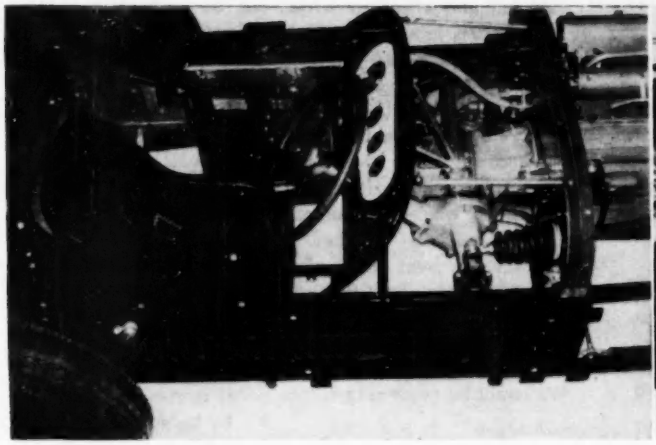
In brief comment on those whose exploits did not land them up near the front end, let it be said that all ten of the money finishers delivered performances like unto none which have gone before at Indianapolis. When a driver runs at race speeds above 130 mph, makes no more than *three* 45 second pit stops and lands in 8th, 9th, or 10th place, *he* knows and his crew knows that a day of *racing* was held in that place on that occasion.

Again the 1954 race inspires superlatives. The fastest race; the fastest pit stops (by far) and most of them smartly done; the finest durability record in the entire history of the classic—not a car was out of the race until the 74th lap! And that one was eliminated because it hit the wall in front of the south block of pits when it was leaving the area after a pit stop of its own.

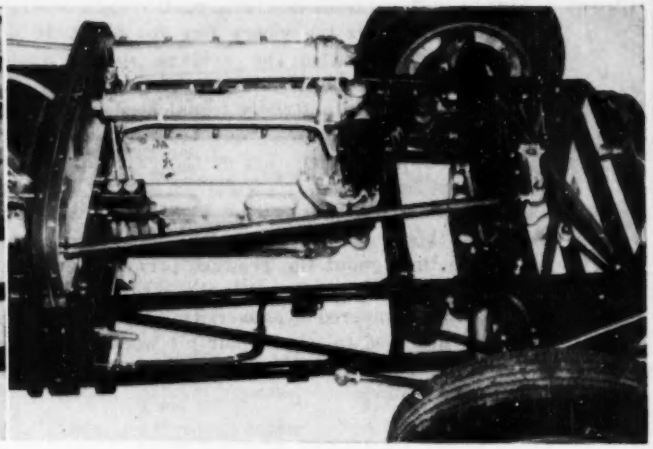
Of course it was a fluke—but a spectacular one. And that note brings us to the most satisfying of all the superlatives to be recorded on this race. It was easily the most spectacular and at the same time the safest race ever run at Indianapolis. It is with real pleasure that your reporter states there were not serious injuries of any kind to contestants even though the entire program was liberally sprinkled with spins and such that kept the monster crowd on its feet.

To set down only one or two instances, there was the collision which occurred right on the main stretch between the cars of Jimmy Daywalt which began the mixup by scraping the wall on the northwest turn and rebounding into the path of Pat Flaherty driving relief in Rathmann's No. 38 Bardahl. The two cars, wheels interlocked for a time, slid to a point in front of the north stands where they separated and the Daywalt car was left partially blocking the straightaway.

A merciful Providence must have made sure that all the other cars could miss the disabled one. This power must also have been looking out for Rathmann when he spun around in another car as a relief driver for one of his Bardahl teammates and his car was left stalled crosswise on the stretch in front of Stand A. The spin was born when a broken crank locked the engine and the rear wheels and the car slid a quarter mile or so until a tire had been ground to shreds and failure, causing the car to pivot on that wheel and bounce lightly from the outer wall to a stop. Rathmann quickly loosened his belt and jumped from the car, then ran for the pits. Fortunately for all, the yellow flag could clearly be seen by the oncoming cars which were following.

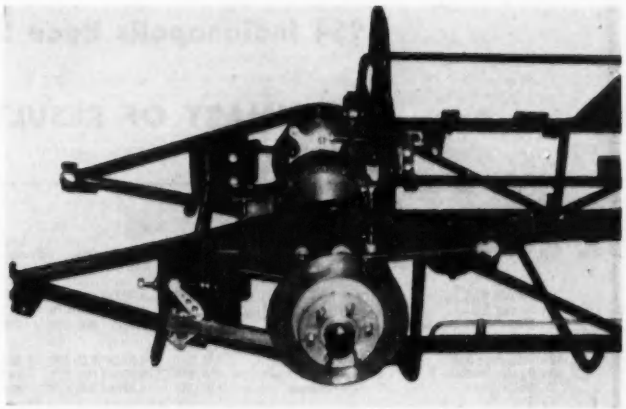


Looking down into driver's compartment of 500C. For better ventilation, louvers are provided in lower side of body, while bulkhead back of driver blocks heat from rear axle.

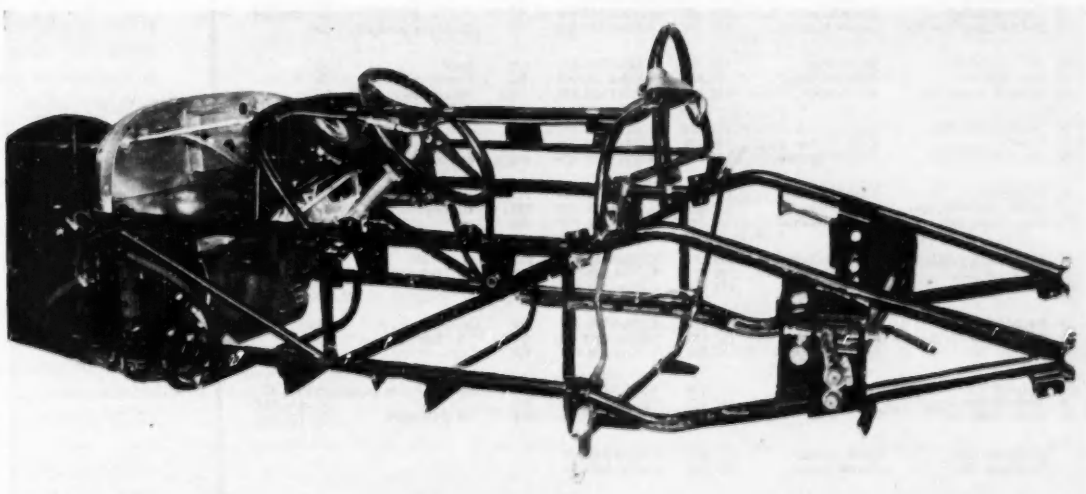


Design of the 500C retains crossed torsion bar springing and trailing front axle. The steering arrangement in this model is new, and incorporates a centrally located drag link.

The weather, per the customary good fortune of the Speedway, was almost ideal. Three hours before the race a quick shower drenched the grounds but it was soon over and the sun smiled almost the rest of the day. Only a gathering thunderhead to the southwest late in the race caused any alarm and it passed on to the east (pelting parts of Indianapolis proper) with no more serious results than gusty winds and very light showers over the south end of the track. Even so, there was enough rain to afford the probable cause of a late spin by Pat O'Connor in the No. 35 Hopkins Special. The car went into the infield but O'Connor was uninjured. (*Continued*)



Suspension arms of the 500C are arranged fore and aft, as shown. The previous model (500B) had these arms in a parallelogram. Transverse torsion bars are retained, but one bar now passes through the tubular rear cross member.



Frame-body structure of 500C. For this, Kurtis uses a girder-type construction of welded round alloy steel tube.

Owing to the crashes described earlier (and others) the race ran under the yellow flag for about 10 or 15 minutes. Otherwise the average speeds would have been considerably higher.

Before turning to a strictly technical slant for the remainder of this account, your observer would list a point or two in summation of the race. First, let it be known that this year's Vukovich victory was not (as before) a downhill coast. We're in a position to know—this crew was plagued by many—and real —troubles throughout the pre-race period. But they kept at the task doggedly with the result that their strength was tempered by adversity. Again, one can say, they deserved to win. Their pit work, as usual, was par for the course; their planning proved to be definitely sound.

Second, and a matter which can be dealt with only in conjecture, is a sight which this witness has seldom seen at Indianapolis—the numerous times we watched various cars roar past the pits with drivers pointing to their own helmets, or heads. That gesture is sign language for "get a relief driver ready." Sometimes it turned out there weren't any.

The 1953 race, with its unexpected toll of heat exhaustion, was one thing; this race, in moderate temperatures, was another. There was heat in this race too—the heat born of pressure, the enervation of terrific pace. In fact, some cars still capable of running well at the end of the race were doing so with "tired" drivers, or, as one owner expressed the situation, "out of chauffeurs."

We could be returning to the point in a cycle where, to be successful, it will be necessary to have a driver who can "go all the way." The cars are holding up rather well these days. Can as much be said of the drivers? If not, where do we get more, and tougher, beginners? Or should we slack off on the cars?

1954 Indianapolis Race Story

SUMMARY OF RESULTS

Start Row	Car No.	Car Name	Driver	Qualifying Speed	Engine	Laps Completed	Cause of Elimination (or No. of Pit Stops) For First Ten	Place and Average Speed
1	2	Hinkle Spl.	Jack McGrath	141.033	4.312x4.625-270	200	3	(3) 130.086
	19	Sumar Spl.	Jimmy Daywalt	139.789	4.375x4.500-270	111	Hit wall and collided with 38	(27)
	9	Dean Van Lines Spl.	Jimmy Bryan	139.665	4.312x4.500-262	200	3	(2) 130.178
2	43	Chapman Spl.	Johnny Thompson	138.787	4.312x4.625-270	165	4 (Flagged)	(24)
	98	Agajanian Spl.	Chuck Stevenson	138.776	4.385x4.500-271	199	4	(12) 125.495
	7	Bob Estes Spl.	Don Freeland	138.339	4.375x4.500-270	200	2	(7) 126.474
3	25	Malloy Spl.	Jimmy Reece	138.312	4.375x4.500-270	194	3 (Flagged)	(17) 121.353
	16	Automobile Shippers Spl.	Duane Carter	138.238	4.385x4.500-271	198	5	(15) 123.670
	17	Lutes Truck Parts Spl.	Bob Sweikert	138.206	4.332x4.625-272	197	3 (Flagged)	(14) 123.779
4	1	Bardahl Spl.	Sam Hanks	137.944	4.375x4.500-270	191	Engine failure	(20)
	34	Automobile Shippers Spl.	Troy Ruttman	137.736	4.375x4.500-270	200	4	(4) 129.218
	35	Hopkins Spl.	Pat O'Connor	138.084	4.375x4.500-270	181	Spun into field	(21)
5	24	Jim Robbins Spl.	Cal Niday	139.826	4.375x4.500-270	200	2	(10) 126.895
	73	McNamara Spl.	Mike Nazaruk	139.589	4.375x4.500-270	200	2	(5) 126.923
	15	Belond Equa-Flow Spl.	Jonnie Parsons	139.576	4.312x4.625-270	79	Could not leave pit	(32)
6	12	Dr. Sabourin Spl.	Roger Ward	139.297	4.385x4.500-271	172	Spun	(22)
	31	John Zink Spl.	Gene Hartley	139.061	4.322x4.625-271	166	Broken clutch	(23)
	51	Jones & Maley Spl.	Bill Homier	138.948	4.312x4.625-270	74	Hit pit wall	(33)
7	14	Fuel Injection Spl.	Bill Vukovich	138.478	4.357x4.500-270	200	2	(1) 130.840
	32	Crawford Spl.	Ernie McCoy	138.419	4.322x4.500-264	194		(16) 122.425
	10	Mel Wiggers Spl.	Tony Bettenhausen	138.275	4.375x4.500-270	105	Engine trouble	(29)
8	68	Schmidt Spl.	Manuel Ayulo	138.164	4.312x4.625-270	197	2 (Flagged)	(13) 124.114
	74	Brown Motor Co. Spl.	Andy Linden	137.820	4.312x4.625-270	138	Steering gear	(25)
	77	Merz Engrg. Spl.	Fred Agabashian	137.748	4.385x4.500-271	200	2	(6) 126.711
9	29	Federal Engrg. Spl.	Larry Crockett	139.557	4.312x4.625-270	200	3	(9) 126.899
	33	Ray Brady Spl.	Len Duncan	139.217	4.375x4.500-270	101	3 Refueling fire	(31)
	45	Bardahl Spl.	Art Cross	138.675	4.375x4.500-270	200	5	(11) 126.232
10	28	Bardahl Spl.	Jim Rathmann	138.228	4.375x4.500-270	110	Collision with 19	(28)
	65	Advance Muffler Spl.	Spider Webb	137.979	4.350x4.6125-274	104	6 Gas tank leak	(30)
	99	Belanger Spl.	Jerry Hoyt	137.825	4.332x4.500-245	130	Engine failure	(26)
11	27	Chapman Spl.	Ed Elisian	137.784	4.332x4.625-272	193	Overheating due to vapor from track	(18)
	6	Ansted Rotary Engrg. Spl.	Paul Russo	137.678	4.375x4.500-270	200	2	(8) 128.037
	71	Martin Bros. Spl.	Frank Armi	137.673	4.312x4.625-270	193	4 (Flagged)	(19) 121.383
Alts.		McNamara Spl.	Eddie Johnson	137.599	4.375x4.500-270			
		Pat Clancy Spl.	Jimmie Davies	137.583	4.375x4.500-270			

The technical statistics of the race was mildly interesting. The box score shows Kurtis-Kraft again had seven of the placers: there were three 500 A's; three 500 C's; and one 3000, the latter redesigned by Russ Snowberger into what might be more or less appropriately styled a type "3500". Ed Kuzma, as last year, had one and so did Myron Stevens. The remaining unit was built up by Bob Estes' crew.

Apparently there were about six cases of mechanical failures in cars eliminated from the race. Four definitely were engine conditions. One of these had

Technical Data on Starting Cars

Car No.	Car Name	Driver	Chassis	Wheelbase (in.)	Dry Weight (lb)	Tire Size	Magneto	Springs
2	Hinkle Spl.	Jack McGrath	Kurtis, 500C	97	1730	7.00x16-Fr. 8.00x18-R.	Joe Hunt	Torsion Bar
19	Sumar Spl.	Jimmy Daywalt	Kurtis, 500C	96	1820	7.00x16-Fr. 8.00x18-R.	Joe Hunt	Torsion Bar
9	Dean Van Lines Spl.	Jimmy Bryan	Kuzma	96	1745(E)	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
43	Chapman Spl.	Johnny Thomson	Nichels-Lesovsky	96	1751(E)	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
98	Agajanian Spl.	Chuck Stevenson	Kuzma	98	1640	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
7	Bob Estes Spl.	Don Freeland	Watson-Phillips	96	1702(E)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
25	Malloy Spl.	Jimmy Reece	Pankratz-Kuzma	96	1680(E)	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
16	Automobile Shippers Spl.	Duane Carter	Kurtis, 4000	96	1660	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
17	Lutes Truck Parts Spl.	Bob Sweikert	Kurtis, 4000	96	1660	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Torsion Bar
1	Bardahl Spl.	Sam Hanks	Kurtis, 4000	96	1606	7.10x16-Fr. 8.00x16-R.	German Bosch	Fr.-Transverse Leaf R.-Torsion Bar
34	Automobile Shippers Spl.	Troy Ruttman	Kurtis, 500A	96	1790	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Torsion Bar
35	Hopkins Spl.	Pat O'Connor	Kurtis, 500C	97	1800(E)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Torsion Bar
24	Jim Robbins Spl.	Cal Niday	Stevens-Ford	100	1730	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
73	McNamara Spl.	Mike Nazaruk	Kurtis, 500C	96	1834(E)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Torsion Bar
15	Belond Equa-Flow Spl.	Johnnie Parsons	Kurtis, 500B	97	1800(E)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Torsion Bar
12	Dr. Sabourin Spl.	Rodger Ward			1750(E)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
31	John Zink Spl.	Gene Hartley	Kurtis, 4000	98	1650(E)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
51	Jones & Maley Spl.	Bill Homier	Kurtis, 500C	96½	1650(E)	7.10x16-Fr. 8.00x18-R.	American Bosch	Torsion Bar
14	Fuel Injection Spl.	Bill Vukovich	Kurtis, 500A	96	1675(E)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Torsion Bar
32	Crawford Spl.	Ernie McCoy	Kurtis, 500B	97	1820	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Torsion Bar
10	Mel Wiggers Spl.	Tony Bettenhausen	Kurtis, 500C	97	1800(E)	7.10x16-Fr. 8.00x20-R.	Joe Hunt	Torsion Bar
88	Schmidt Spl.	Manuel Ayulo	Kurtis, 500C-Kuzma Mod.	96	1800(E)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Torsion Bar
74	Brown Motor Co. Spl.	Andy Linden	Schroeder	100	1675(E)	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Torsion Bar (I.F.S.)
77	Merz Engineering Spl.	Freddie Agabashian	Kurtis, 500C	97	1800(E)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Torsion Bar
28	Federal Engineering Spl.	Larry Crockett	Kurtis, 3000, Modified	96	1820	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Torsion Bar
33	Ray Brady Spl.	Len Duncan	Brady	98	1720	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
45	Bardahl Spl.	Art Cross	Kurtis, 4000	96	1627	7.10x16-Fr. 8.00x16-R.	German Bosch	Fr.-Transverse Leaf R.-Torsion Bar
38	Bardahl Spl.	Jim Rathmann	Kurtis, 500C	100	1840(E)	7.10x16-Fr. 8.00x18-R.	German Bosch	Torsion Bar
65	Advance Muffler Spl.	Spider Webb	Bromme	97	1650(E)	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
99	Belanger Spl.	Jerry Hoyt	Lesovsky—To Belanger Specs.	97	1653	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Torsion Bar
27	Chapman Spl.	Ed Elisian	Myron Stevens	98	1700	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
5	Ansted Rotary Engineering Spl.	Paul Russo	Kurtis, 500A	97	1700(E)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
71	Martin Brothers Spl.	Frank Armi	Joe Selnes	96½	1680	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Fr.-Transverse Leaf R.-Torsion Bar
83	McNamara Spl.	Eddie Johnson	Harry Turner	98	1700	7.10x16-Fr. 8.00x16-R.	German Bosch	Torsion Bar
53	Pat Clancy Spl.	Jimmie Davies	Kurtis, 500B	98	1800(E)	7.10x16-Fr 8.00x16-R.	Joe Hunt	Torsion Bar

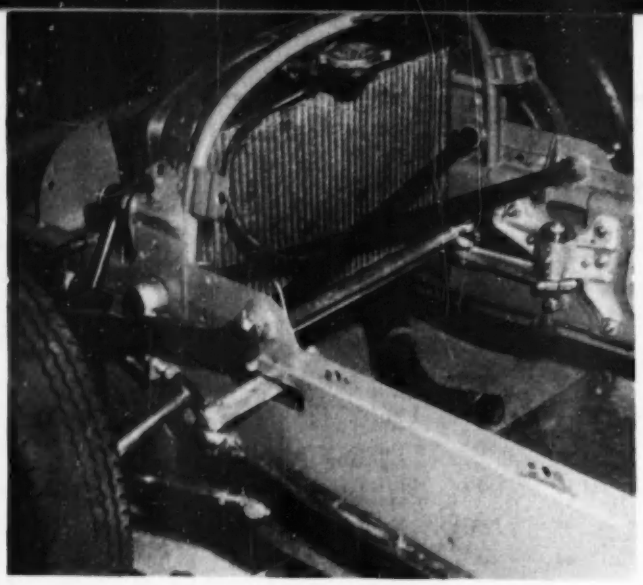
Above data obtained from records of AAA technical committee as of May 30.

(I.F.S.) = Independent Front Suspension. (E) = Estimated weight.

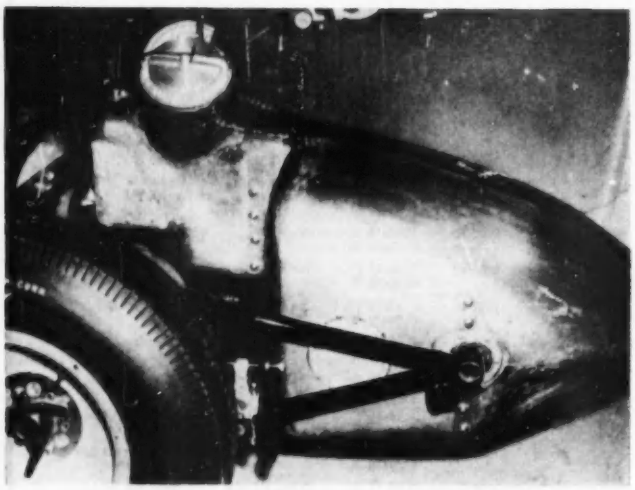
All cars had spot brakes but the No. 65 Advance Muffler Spl.—it used drum type brakes. All cars used magnesium wheels all around but the No. 74 Brown Motor Co. Spl.—it used wire wheels in front; magnesium in rear.

All cars rear drive. All engines Meyer-Drake "270" four cylinder. All used Hilborn fuel injectors and methanol-base fuel. All engines equipped with Champion spark plugs and Perfect Circle piston rings.

Most magnetos listed as "Joe Hunt" were basically Bendix-Scintilla.



Kurtis-Kraft Type 500A steering articulation: drag link runs along outside of frame in conventional manner to a build-up bell crank on left side of frame. Corresponding to this bell crank is a rocker arm assembly on right inner side, as seen in this view. The lower arms of these units are connected by a link and to the same studs are secured short links to each knuckle arm, thus completing the steering linkage. Heim ends are used throughout. Steering gear is conventionally mounted in cockpit.



Kurtis-Kraft Type 500C Fuel Tank. This design continues use of three point mounting but left front portion of tank is cut out to provide clearance around rear axle gear housing. Front mount of tank is now a relatively large, rubber-lined ball and socket. Tank is coated externally with Fiberglas.

a broken crankshaft. There was a broken clutch. One car suffered what formerly was a common complaint back in the days of board tracks—it picked up a piece of stray newspaper from the track and overheated viciously.

When the race was half run very few cars had been eliminated. Mechanically the cars held up exceptionally well—especially in consideration of the unprecedented speeds. One point of special interest to this reporter was the number of engines stalled as cars were attempting to pull out of the pits and resume the race.

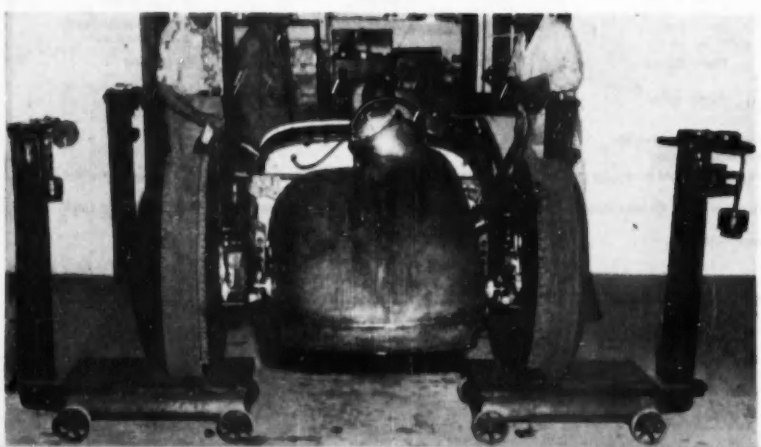
The use of the so-called fuel injector is a factor in this condition. Idling speeds must be high to provide continued operation while car is in the pits. With such high idling speeds it is difficult to get the transmission into gear. And the injectors do not like to "pull" very well under that type of engine load. Clutches cannot be "soft." It makes a three-cornered problem.

As for the higher speeds this year, practically all observers of the 500-mile race feel that improvements in racing tires by the Firestone people have accounted for a sizeable proportion of the speed increases. The Firestone company announced prior to the race that its racing tires now have nylon construction and that this type of tire has been on test for more than four years.

In order to make maximum use of nylon's potential advantages as a structural material Firestone racing tire engineers had to carry out researches into improved tread compounds, dipping processes for the nylon cords used and various other angles of rubber materials in connection with this program. The results of this work are embodied in the new type of tire which not only supports and makes possible higher speeds but mounts more tread for longer wear.

This year many mechanics and drivers again resorted to multi-shock absorber installations in the attempt to reach the higher speeds anticipated for qualifying. In some cases two pairs of telescoping shocks were

(*Turn to page* 156, *please*)



Since the advent of torsion bar springing (shortly after the war) on Indianapolis cars, mechanics and drivers frequently check balance (torsion bar loading) by placing their cars on four platform scales as shown here. Torsion bars are adjustable by means of opposed set screws bearing on levers splined to the bars. Wheel "dig," "bite," "wedge," or car trim, frame-to-axle clearance, etc., are established or corrected on the scales.

Fiat Experimental Car . . .

Experimental car undergoing speed tests. It is claimed that a top speed of 155 mph was attained.

. . . Has 200-Hp Gas Turbine Engine

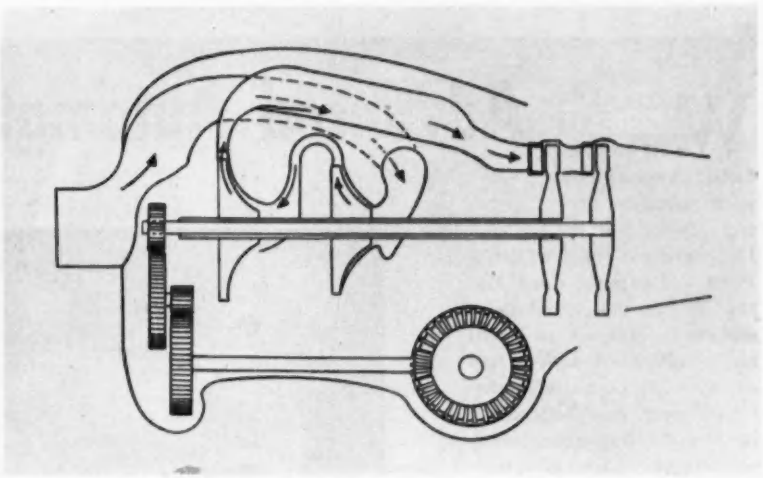
THE experimental gas turbine powered car which was displayed by Fiat at the recent Italian automobile show in Turin has a unit power plant which includes the engine, reduction gearing, and ring gear and pinion assembly.

There are three combustion chambers, all mounted above the center of the unit to conserve space. The two-stage centrifugal compressor is driven by one turbine while the other turbine furnishes power to drive the vehicle. The power turbine is on a shaft which passes through the compressor shaft and terminates in a pinion at the front end, driving a set of double reduction gears. Final drive is through a pinion and ring gear.

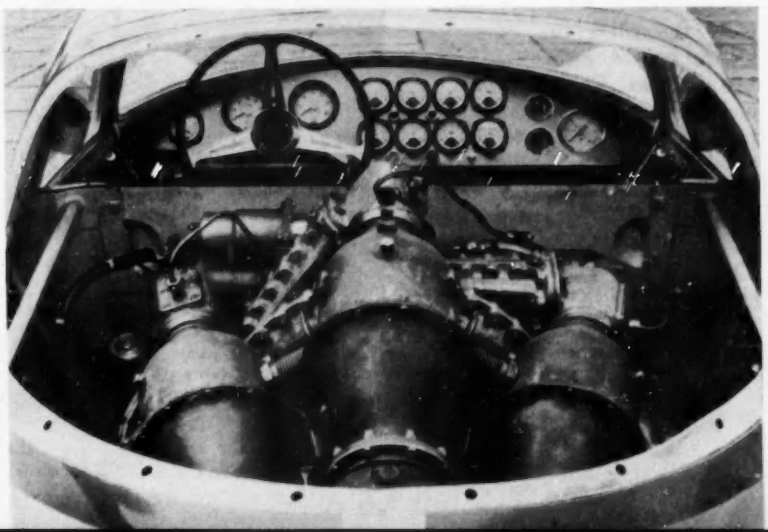
Output is given as nearly 200 hp at 22,000 rpm, but it is believed that more power could be developed at higher turbine speed.

The chassis has a tubular frame and independent suspension for all four wheels. With the power plant mounted at the rear, direct drive is provided to the two road wheels by transverse, universally-jointed shafts. A bulkhead separates passenger space from the engine compartment, access to which is secured by removing a portion of the rear of the body. Fuel tanks are carried at each side, just outside the frame and occupying the space between

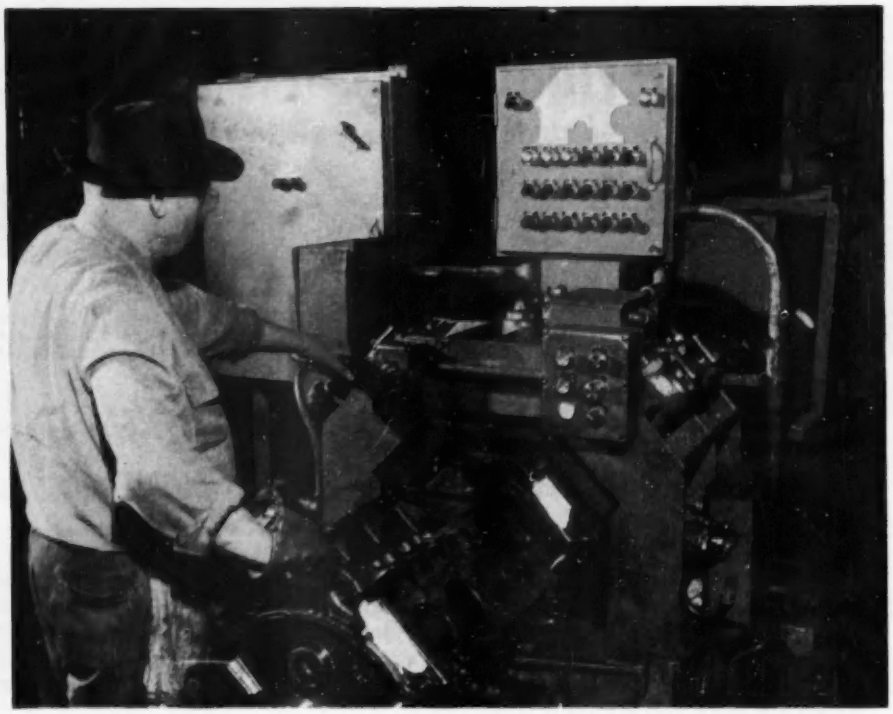
(*Turn to page* 107, *please*)



International News photos



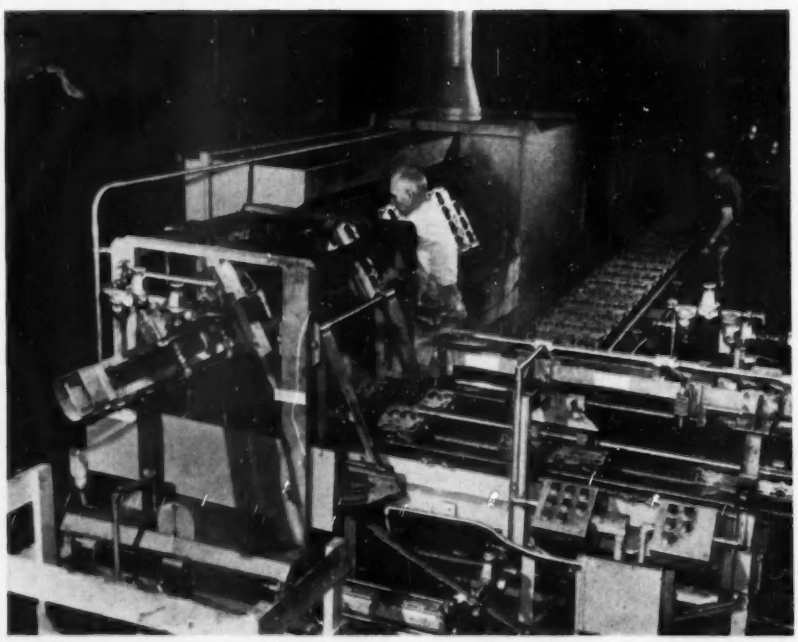
At top right is a schematic diagram of the Fiat gas turbine power plant. At immediate right is top view of the power plant showing the three combustion chambers. Weight of the unit is 480 lb.



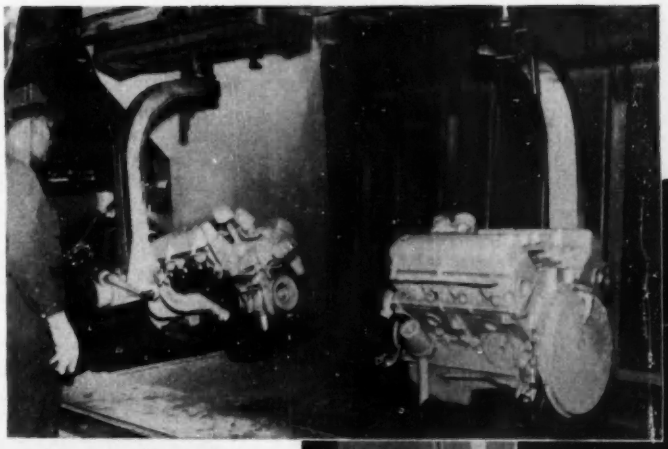
Start of automation on the cylinder block machining line. Here the rough castings are loaded into the electrically - controlled target fixture designed to qualify automatically all major surfaces of the block. It has two principal functions; it gages at critical points to make sure that no excess metal is present to damage the Cincinnati surface broaching machine, and at the same time it makes certain there is sufficient metal to clean up properly on all machined surfaces. Automation transports work from the target fixture into the broaching machines.

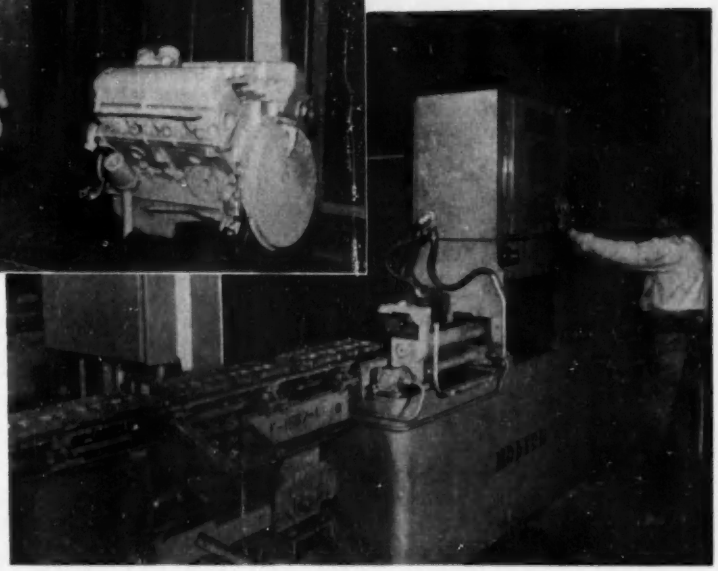
Advanced Automation Techniques

WITH the establishment of new manufacturing facilities at Dearborn for the 1954 OHV Ford V-8 engine, Ford Motor Co. has developed automation techniques on a still more advanced basis, has extended it to more operations, and has succeeded in simplifying automation mechanism. This advancement of the art stems from the earlier pioneering developments, making it possible to utilize the experience gained on existing installations. The continuous search for improvement has resulted in simplifying the layout and in facilitating maintenance.



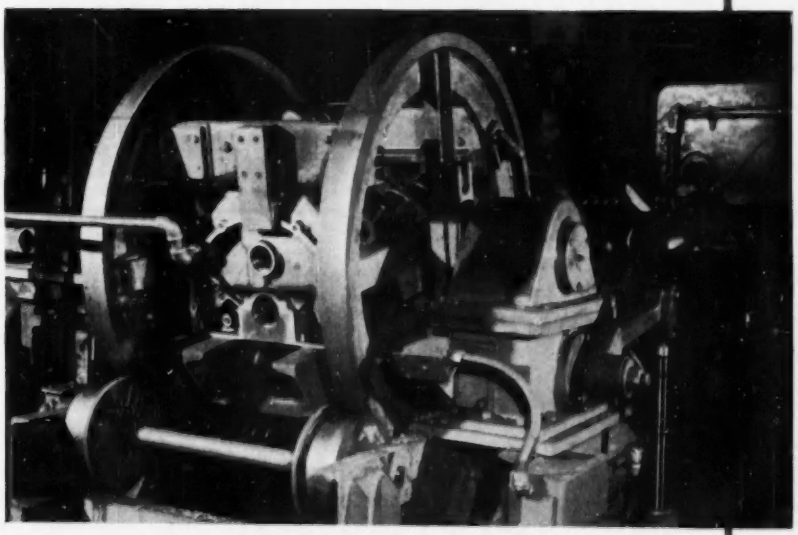
Full automation has been applied to the loading and unloading of the long Solventol washing machine installed for the cleaning of Ford V-8 cylinder heads. In the foreground is visible the automation transfer mechanism for feeding cylinder heads to the loading station at the left. At this point the work is picked up by an inclined transfer mechanism and loaded onto the inclined washer conveyor.



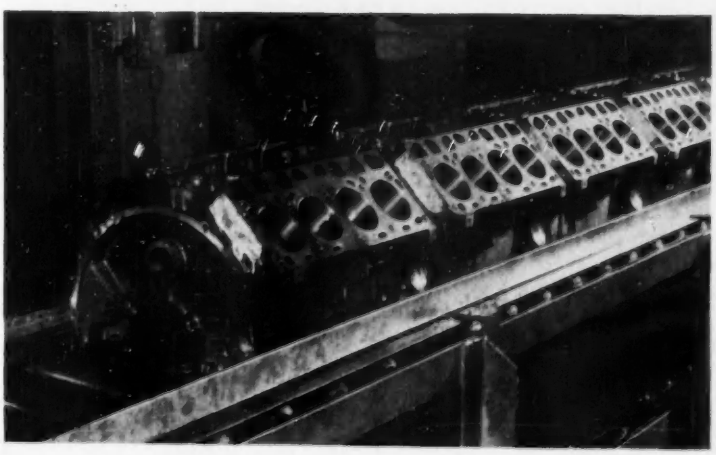


The power-and-free conveyor system that controls movement throughout the engine assembly and test area is illustrated above in the transportation of assembled engines through the system of Mahon water-back spray booths. The conveyor section in this area functions automatically with power on.

A network of automation conveyor systems transports cylinder heads from Expert machines which press in Welch plugs to the Modern air-testing machines seen at the right. Automation takes over the loading and unloading so completely that the only function of operators is to observe the operation of the machines and instruments.



This is a 180-deg turnover automation mechanism at the junction of two major operations set up at right angles to each other. It receives blocks broadside from a machine at the left, turns them so the banks are in up position, then feeds the work into the LaPointe surface broaching machine at the extreme right. Upon completing this cycle, the fixture automatically returns to normal position ready to receive the next block.



Where it becomes necessary to transport Ford cylinder blocks over longer sections of automated lines than can be served practically by shuttle type transfer units, power driven roller conveyors have been installed at Dearborn. By moving the work under constant pressure, this type of conveyor eliminates manual handling. It is fast and positive in feeding automation transfer connections located ahead of transfer machines.

Overall view of the all-plastic truck designed by United Parcel Service for use on its door-to-door delivery routes in major U. S. cities. The 650-lb plastic body, built by Lunn Laminates, is mounted on a one-ton modified Ford forward control truck chassis.

Plastic Truck Body Weighs 60 Per Cent Less

IN addition to the increasing number of cars and truck-trailers with reinforced plastic bodies that are in current usage, there is now a truck with an all-plastic body which may soon be running on the streets of our larger cities. This vehicle, designed by United Parcel Service with a body produced by Lunn Laminates, Inc., is said to be the first all-plastic body delivery truck in commercial service.

Built around a UPS-modified Ford forward-control type truck chassis, this new polyester-glass unit was constructed of 19 parts including the gasoline tank. Although the prototype model of the door-to-door type delivery vehicle was contact molded, production models will be produced by the vacuum bag technique.

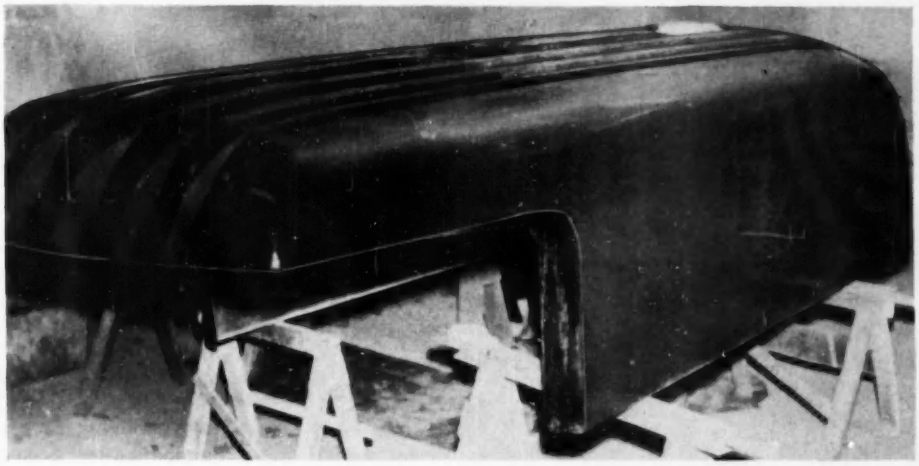
One and two ounce mats of Owens-Corning Fiberglas were used along with the polyester resin. The ratio is 62 per cent resin and 38 per cent glass. Total weight of the ⅛ in. thick molded body is 650 lb, about 40 per cent the weight of the former body construction.

Two of the largest parts are the lower body and the roof sections. The lower body section consists of the lower body panel, the floor, and the rear wheelhouses. Side panels and the cab top are molded integrally with the roof section. A portion of the roof has been made transparent in order to provide a well-lighted interior. Both the lower body and roof sections are shown in the accompanying illustrations.

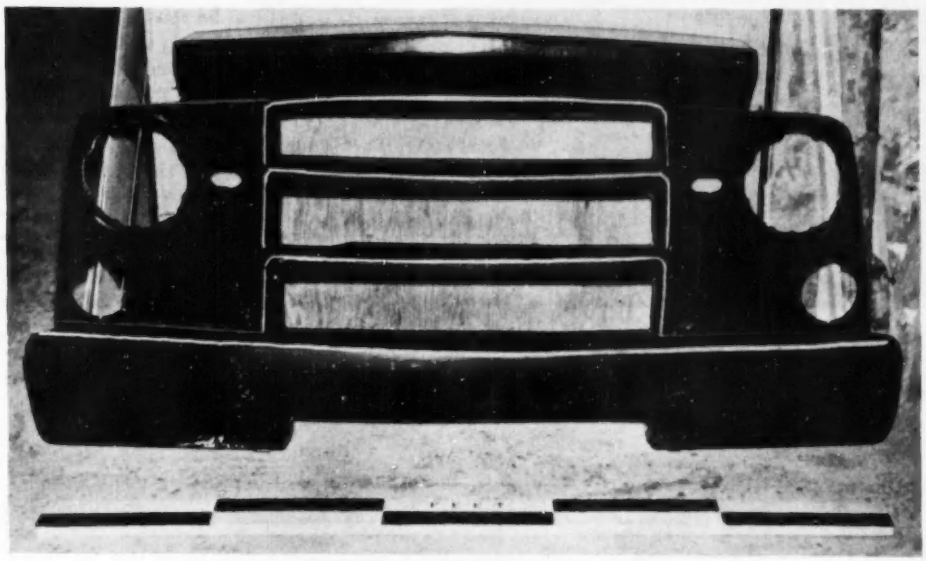
One of the noteworthy features of the truck is that the UPS brown color has been impregnated in the plastic parts. Another special feature is the all-plastic overhead disappearing package door in the rear of the vehicle. Disappearing type sliding doors are used in the cab section. Each of these plastic sliding doors is composed of inside and outside moldings bonded together.

Steel bolts are used to attach the body to the frame, and metal hardware is utilized for the sliding doors. The cab floor, door tracks, and bulkhead back of the driver's seat are fabricated of aluminum, and are the only other metal parts used in addition to those mentioned.

According to Harry T. Douglas, vice president of Lunn, it has been proved by Lunn's previous experience that trucks and car bodies in lots of 1000 or 2000 of a given design are very economically

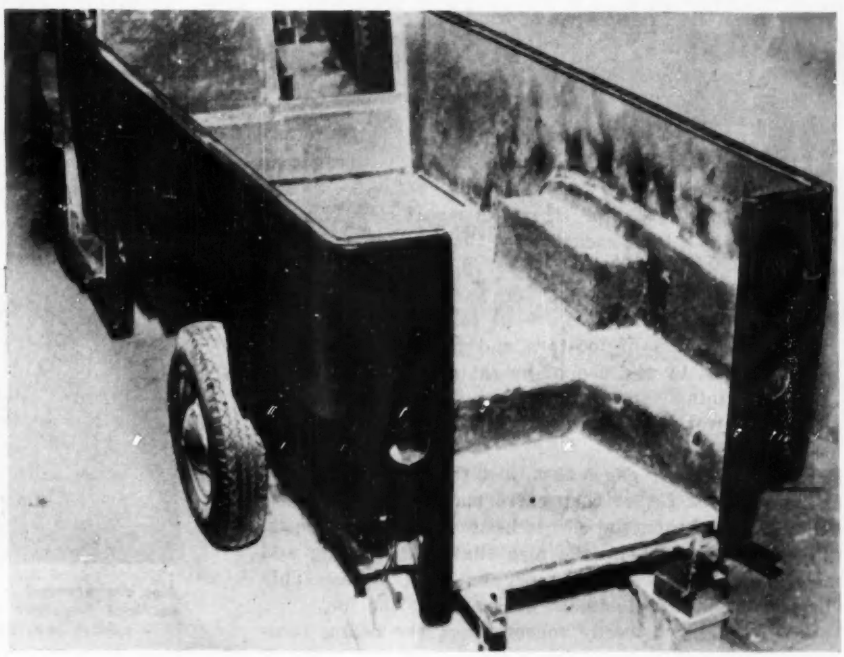


A clear panel has been molded in the roof section which also comprises the upper body sides and cab top.



Grille of the UPS reinforced plastic truck. This part is in the as-molded state.

molded in glass fiber reinforced plastic. Further, plastic tools are indicated for these quantities; thus the amortization of tooling over this limited number of parts more than compensates for the higher per pound price of reinforced plastics when compared with other materials.



The one piece lower body is shown mounted on the Ford Truck chassis. Each section has been trimmed, sanded and buffed previously.

The height gage is the most essential measuring tool used in this type of construction. It has been found that a greater degree of accuracy can be maintained by setting locators and fixtures prior to assembling the completed framework.

Reusable Airframe Jigs of Cast Iron or Aluminum

AIRFRAME jigs of cast iron or aluminum have replaced welded pipe or welded steel sections at the Prospect Plant of Cessna Aircraft Co. The sections are cast hollow, except those that are gusseted, and are left slotted on all four sides. The beams are then machined on all sides to provide a working surface for jig fixtures and locators.

The installation of locators and fixtures is done on surface tables by the use of height gages which allows "assembly-lining" jig shop work by sequencing operation, or by working several parts of the same jig at the same time.

By using height gages to adjust the fixtures, vertical shims are used rather than cerro matrix. No holes are drilled in the beam, the slot is used with a large special nut on the inside. The slot also eliminates drilling and tapping of bolt holes necessary on solid plates. This allows horizontal adjustment by loosening the nut.

When the jig is ready for erection, the beams complete with fixtures are taken to the work area where they are assembled by bolting the sections together.

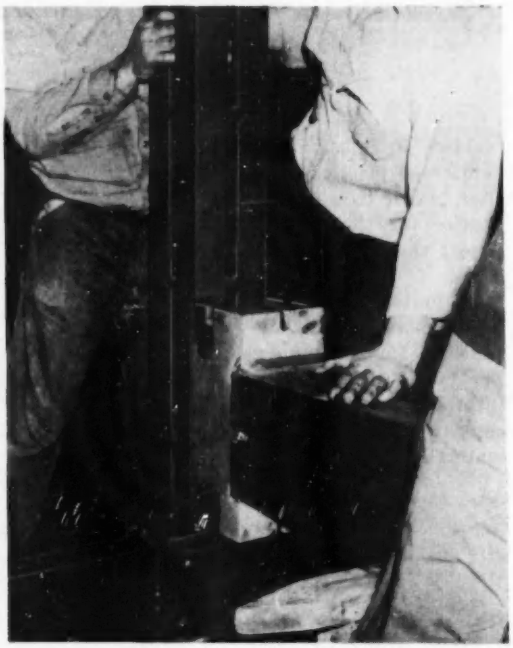
Beams have been standardized by cross sectional area and bear part numbers, hence design time is reduced by designating all structural members by part number rather than detailed drawings. Other design standards are being worked out such as "12 in. upright with eight in. cross-members."

Although the cast material is roughly 25 per cent more expensive than the pipe or steel beams commonly used, the jigs are 85 per cent salvagable and the beams can be reused indefinitely. Welded pipe jigs have only scrap value.

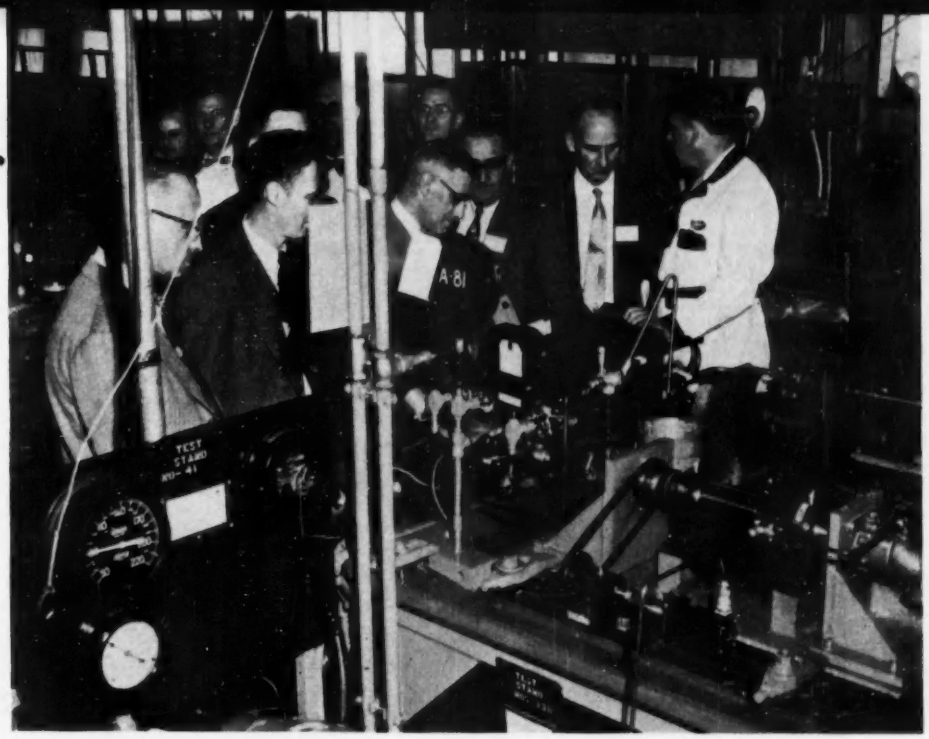
Jigs may be shipped from one plant to another easily, by disassembling the sections and accompanying the shipment with an assembly diagram. The jigs when disassembled require little room except for length, thereby avoiding special railroad routings due to side and overhead clearance.

When faced with model changes, the fixtures and locators can be filed by part number in the warehouse to be quickly assembled to a standard beam for an order of spare parts and the same structure can be used for new models. Otherwise, entire jig structures would be stored for

(*Turn to page* 96, *please*)



Jigs are erected in the assembly areas by fitting the sections together and bolting them to the beams. Slots provide for convenient attachment



One of the many interesting setups observed during the plant tour

Vickers Holds First Hydraulics Forum

By Joseph Geschelin

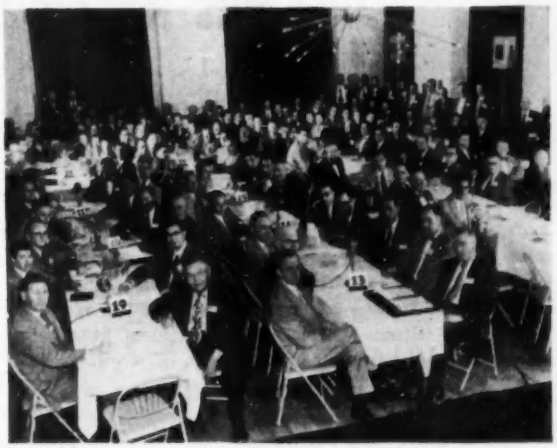
THE vital role of hydraulic mechanism in modern machine tools, automation devices, and industrial applications was given still greater impetus and status by the recent two day Production Machine Tool Hydraulics Forum, sponsored by Vickers, Inc. Held in Detroit last month, it represented the first venture of its kind and although Vickers considered it purely experimental, it attracted an attendance of over 160 people.

Our own impression is that the meeting was so successful and productive of so much practical information that it is bound to develop into an annual affair of major proportions.

It was only natural that a three-way exchange among users and producers of hydraulic equipment, and manufacturers of machine tools, would result in some important conclusions. Without going into details, we should like to summarize some of the most significant developments stemming from this conference.

1. The exchange of experiences is expected to result in greater progress toward elimination of leaks in plumbing and mechanism. Leakage is one of the most pressing problems today and deserves further exploration.

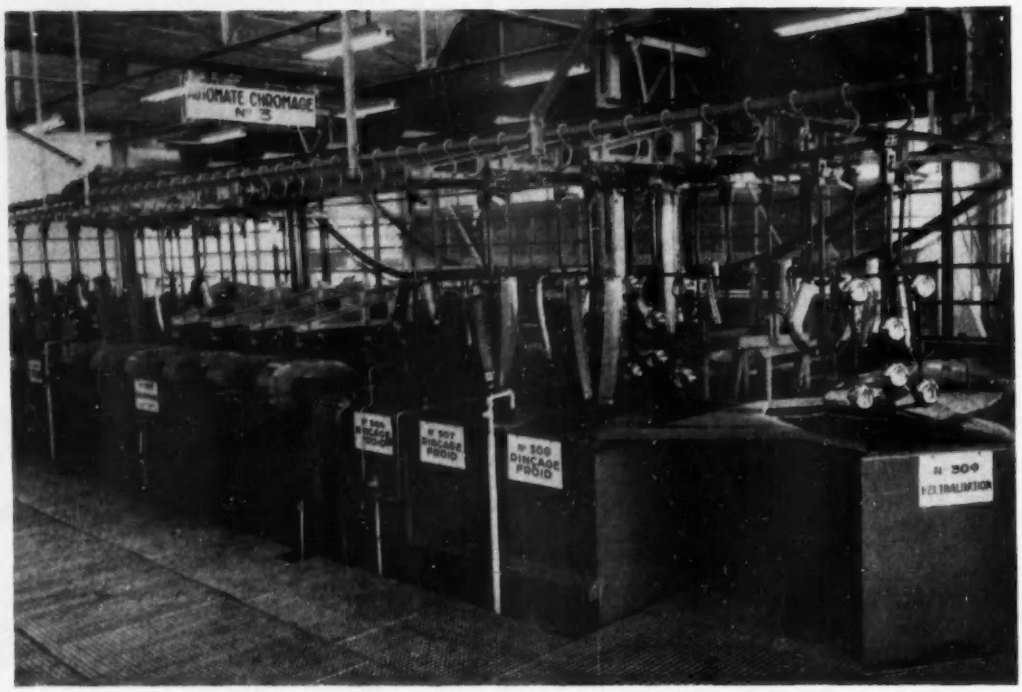
2. Since maintenance is a number one activity in all plants, the users were unanimous in requesting further refinements, particularly by way of more accessible mounting of valves and other accessories that require regular inspection. Too, demand was made for more general availability of piping diagrams to facilitate maintenance.



General view of conference

3. Preventive maintenance occupied the center of the stage and resulted in the conclusion that through cooperation of all concerned it should be possible to

(*Turn to page* 86, *please*)



Section of Simca's automatic plating line.

French Automobile Maker Has Automatic Plating Plant

At an expenditure of $1-million, Simca, of Paris, has just put into operation a completely automatic chrome plating plant claimed to be the largest and most modern in Europe. Generally, European chrome plating specialists are not equipped for either quantity or quality production. In France, Renault and Citroen have their own plants. With the addition of Simca there are now three automobile manufacturers engaged in this class of work.

Designed after an inspection of many chrome plating plants in America and in Europe, the Simca installation consists of about two-thirds French plant and one-third foreign. It is laid out for the production in 14 hours of all chromium plated parts required for 400 cars. Covering an area of 27,000 sq ft, it is divided into a polishing and a plating section, this latter being completely automatic and air conditioned.

New Materials Paraded At Chicago Exposition

Featuring metals, plastics, rubber, ceramics, wood, glass and their latest industrial applications, the Second Basic Materials Exposition last month in Chicago attracted a large number of engineers during its four-day run. Approximately 65 exhibitors participated in the event.

Frenchtown Porcelain Co. showed a large variety of high alumina ceramic products made possible by its new grinding facilities. New types of glass for special applications in the fields of automation, atomic energy, and precision casting of metals were displayed by the Corning Glass Works, while Bettinger Corp. presented its applications of high temperature ceramics on automotive exhaust systems, jet engine nozzle boxes, and combustion chambers.

The Chemical Div. of Goodyear Tire & Rubber Co. introduced its Plio-Tuf plastic pellets for injection molding of high impact and high heat resistant articles and also featured a new dry blending Pliovic resin. A new flooring material, consisting of a rubber-based plastic for the surface and bonded to solid or laminated hardwoods, was demonstrated by U. S. Rubber Co.

Featured at the Malayan Tin Bureau exhibit were specimens of tin alloys, chemical compounds containing tin for improving plastics, ceramics and paints, and a new copper-manganese-tin alloy which resists

(*Turn to page* 107, *please*)

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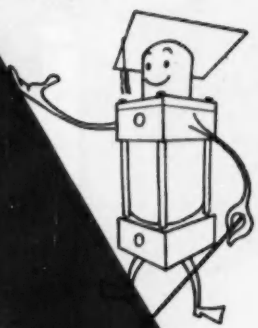

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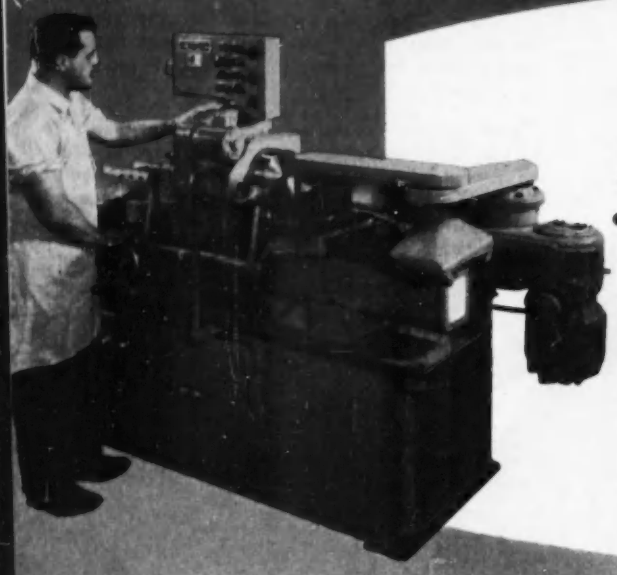
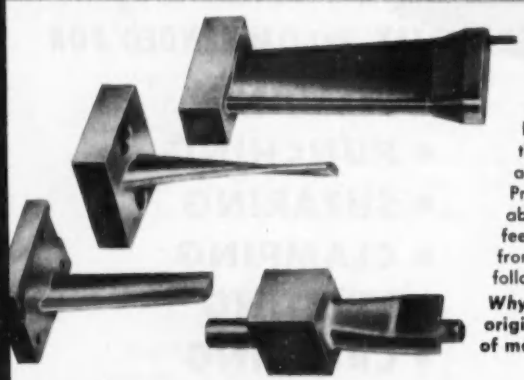


- WORKING DIRECTLY FROM SIMPLE CROSS-SECTIONAL TEMPLATES AND DATA ON AIRFOIL DRAWING
- WITH AUTOMATIC INTERPOLATION—TRUE FAIRING BETWEEN AND BEYOND THE CROSS-SECTIONAL STATIONS
- WITH NON-CONTACTING TRACER CONTROL
- PRECISION MACHINED
- IN HOURS INSTEAD OF WEEKS

NEW MODEL 102 electronic AIRFOIL MILLING MACHINE



Heretofore original masters were made by hand — no generating method being available. Now, in a matter of hours rather than weeks, the first master can be produced — hours in a single machine rather than weeks of skilled bench work. Simple templates, made to represent designer's airfoil cross-sections, together with data on drawing, are the only "special tools" needed by the machine. True fairing between and beyond the designated cross-sections is automatically produced by the machine interpolation systems. *True* fairing of shape and of twist-of-shape is accomplished automatically.

Principal motions of workpiece during generation of master airfoil are: (1) rotation about axis, (2) high-speed motion of milling head to and from axis, and (3) slow feed of milling head parallel to axis. Signals to produce motion (2) are obtained from the completely new NON-CONTACTING tracer control, which always exactly follows, *but never contacts* the constantly changing interpolation "flexure".

Why not use this method **to generate the whole airfoil surface on your original airfoil masters — and, in addition, to provide a convenient means of machining pilot production runs?**

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PESCO Pressure-Loaded
Model 052817 Hydraulic
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If you are interested in "man-sized" power for your heavy duty power-steering systems without excess bulk or weight, you'll want to test the Pesco Power-steering Pump on your specific equipment.

This outstanding Pesco pump is specifically designed and ruggedly constructed to provide full, dependable power steering for on-and-off-the-road heavy duty vehicles. It is not an adaptation of a standard passenger car unit applied to heavy duty use. The unit provides a standard pressure relief setting of 750 psi, with optional pressures to 1200 psi if desired.

A limited number of these exceptional Pesco pumps are available for field tests on specific equipment. For full information call or write the Home Office, Bedford, Ohio.

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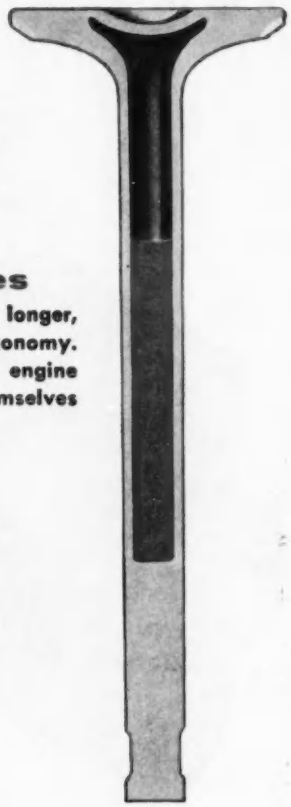
Eaton Offers 5 Methods of Increasing Valve Life

Eatonite-Faced Valves

Eatonite—heat resistant, corrosion resistant, wear resistant—applied to valves by a special Eaton-developed process adds materially to valve life in commercial vehicles and in heavy-duty industrial engines. Available as solid valves, hollow sodium-cooled valves, or free-valves.



Eaton Sodium Cooled Valves

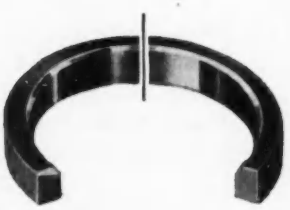
Eaton Sodium Cooled Valves run cooler, last longer, maintain a high level of engine output and economy. They ordinarily require no attention between engine overhauls; keep trucks on the job; pay for themselves many times over.

Eaton Free-Valves

Freedom to turn in either direction prevents formation of stem and uneven seat deposits; prevents sticking and scuffing; prevents valve burning and guttering; effects an appreciable increase in valve life. Eaton Free-Valves can be applied to engines of all types and sizes without costly design changes.

Eaton Hydraulic Valve Lifters

Eaton Zero-Lash Hydraulic Valve Lifters maintain zero valve clearance at all temperatures, and under all operating conditions; improve valve seating; prevent valves pounding into seats. Available in all types and in all materials, including heat-treated steel, hardenable iron, chilled-face, and puddled-face.



Eatonite Valve Seat Inserts

Valve seat inserts of Eatonite—heat resistant, corrosion resistant, wear resistant—reduce valve failure caused by prolonged operation at excessive temperatures and maintain a high level of engine output. Available for all types of engines.

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Welding eliminated HERE

Welding operation required in two-piece construction was eliminated by cold heading bolt in one piece.

Roll threading permitted faster production at lower cost.

A manufacturer of power lawn mowers uses a bent eyebolt as a mounting brace to adjust the cutting height of the mower blades. The bolt was formerly produced by welding an eye forging to a bolt made on a screw machine . . . and then bending into the shape needed. National was asked how this bolt could be produced faster and at lower cost.

National's "Special Products Service" came up with a method of producing the bolt in one piece by cold heading and roll threading. In this way, the welding operation was eliminated and the manufacturer realized a lower unit cost. Thanks to National's wide range of cold heading equipment and specialized know-how . . . the same type of economy can be offered you.

Bring your "Special" problems to National

Do you have a fastener or a small part problem that can be solved by National's "Special Products Service"? Our representative will be glad to discuss your needs. Write for free copy of National's "Special" fastener booklet.

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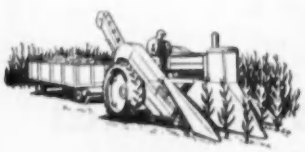


Everybody reaps the benefits of John Deere's fastener engineering on their new No. 227 Corn Picker. The farmer saves maintenance hours . . . the dealer makes fewer service calls . . . and John Deere cuts assembly costs 50%!

This triple play resulted from John Deere's six years of field testing and research into fastening methods. Studies proved that rugged, self-retaining SPEED NUTS provide the simplest, fastest, most secure attachments, and make servicing far simpler.

Similar savings and advantages can be yours. See your Tinnerman representative for details on our free Fastening Analysis Service.

Self-retaining "U" and "J" Type SPEED NUTS hold themselves in screw-receiving positions for blind-location assembly. John Deere uses sturdy 14Z sheet metal screws, power-drives them into nuts—no pre-assembling! SPEED NUTS can't freeze on threads—screws are always easy to remove for servicing.

Write for your copy of "SAVINGS STORIES"—a volume filled with fastening ideas. TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners Ltd., Hamilton, Ontario. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S. A., 7 rue Henri Barbusse, Levallois (Seine).

News of the MACHINERY INDUSTRIES

By Thomas Mac New

New England Machine Tool Builders Add Manufacturing Space. U. S. Imports of Foreign-Made Tools Continue to Decline.

First Quarter Machinery Shipments

Statistics compiled by Business and Defense Services Administration show a somewhat slower start on deliveries of metalworking machines this year than last. At the same time, they also indicate instances wherein the industry pulsebeat is stronger than it was in 1953.

Over-all metalworking machinery deliveries in the opening quarter, as reported to BDSA by 258 firms handling 95 per cent of all shipments, amounted to $328.3 million. In the same months last year, the total was $380.3 million.

Included in the latest estimate were $290.9 million of cutting-type machine tools and $67.4 million of the forming and shaping types. Last year, shipments consisted of $315.3 million of the cutting type and $65 million forming and shaping types.

Principal items shipped in the cutting tool category were lathes and boring machines, with grinding and milling machines next.

New orders for these cutting-type tools averaged $45 million per month, as compared with an $83 million average for first quarter 1953. Unfilled orders on March 31 reflected a five-month backlog.

Predominant among shipments of forming and shaping tools were mechanical presses and hydraulic and pneumatic presses. These accounted for more than half of all shipments in this class. Forging machinery and hammers were next in importance.

New orders for tools in this category in the first quarter averaged $15.6 million per month. In the same months of 1953, the average was $23 million.

Unfilled orders, valued at $226.5 million at the end of March, reflected a 10-month backlog.

Trend of U. S. imports of foreign-made tools continues down. Imports in January and February were valued at $4.1 million, while in the same months last year they amounted to $6.7 million.

Switzerland and West Germany provided about 65 per cent of the tools brought into this country in the first two months of the year.

Fellows Adds Space

Two additions have been made to the Fellows Gear Shaper Co. plant in Springfield, Vt. A three story wing on the office building has added 7000 sq ft to office and engineering department space. A separate shop building has also been erected, giving 26,520 sq ft of added floor area.

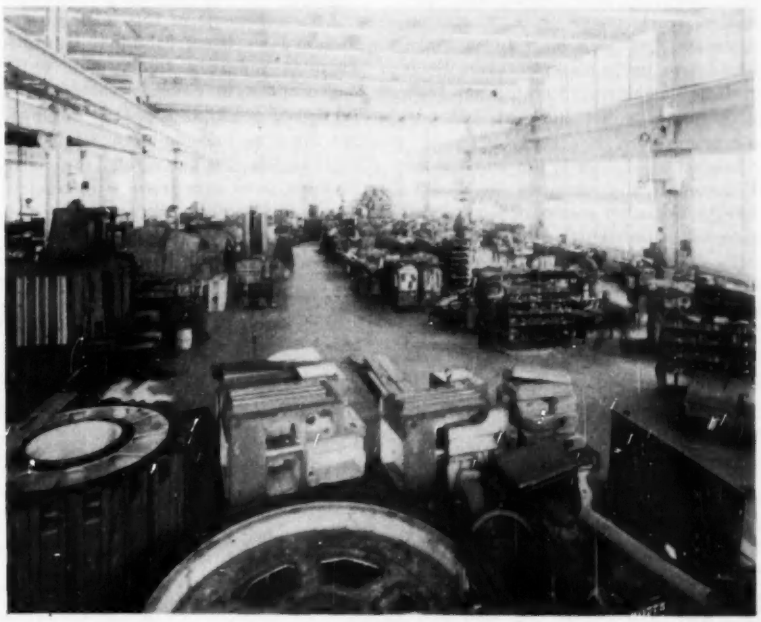
The main section of the shop building is single story, 180 ft by 90 ft and 32 ft high. It is equipped with cranes and new machines of adequate capacity for processing the large castings used in the No. 10 Rotary and 120-in. gear shapers. These machines, together with several others are assembled in this section of the building.

The rest of the building is of two story construction with the sheet metal and welding departments occupying the ground floor. A metallurgical laboratory, fully equipped for chemical analysis and microscopic study of steels, and an electrical panel assembly room are on the second floor. Note illustration below.

Gisholt Plans For Tool Rental

Gisholt Machine Co. has worked out final arrangements of plans for the leasing of machine tools. Several plants already are operating Gisholt machines under this new setup. Three plans are available, each based on a seven-year lease agreement. Each may be written either with or without the option to purchase. The right

(*Turn to page* 148, *please*)



Interior of the new Fellows Gear Shaper plant addition at Springfield, Vt.

NEW EQUIPMENT PLANT • PRODUCTION

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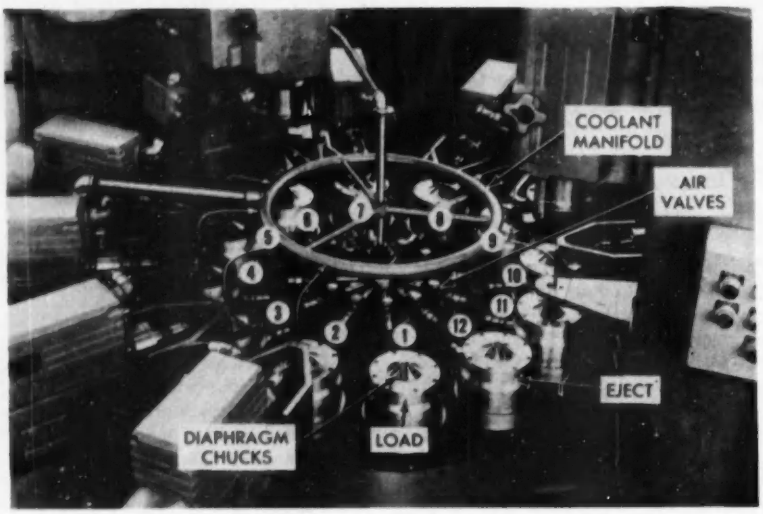
Three Operations on Plungers



The 12-station Turner Special for finishing holes.

A machine for automatically drilling, reaming and deburring production work pieces in a 12-station operation, has been built for a large automotive parts manufacturer. Each of three machines is turning out 1400 valve plungers per hour at 100 per cent efficiency.

Loaded at station 1, the work piece is automatically clamped in a diaphragm chuck by means of air valves mounted in the center of the indexing table, then indexed to station 2 where one 3/32-in. hole is drilled while the operator loads another part. At station 3, the diaphragm chuck rotates 90 deg. and another 3/32-in. hole is drilled. The same operation takes place at stations 4 and 5 while the indexing and loading cycle continues.

At station 6, a 0.406-in. hole is reamed by a vertically mounted reamer, removing the burr caused by drilling. At stations 7, 8, 9 and 10, the drilling operation is repeated since the reaming causes some of the burrs to be pushed back into the 3/32-in. holes. This redrilling pushes the burr back into the 0.406-in. hole and is finally removed entirely at station 11 by a duplicate vertical reaming operation.

All components of this machine are standard — base, columns, Hautau-Turndex indexing table, drill units and diaphragm chucks; should production of one kind of part be stopped, the machine can be used again for another job. *Turner Bros., Inc.*

Circle 56 on page 73 for more data

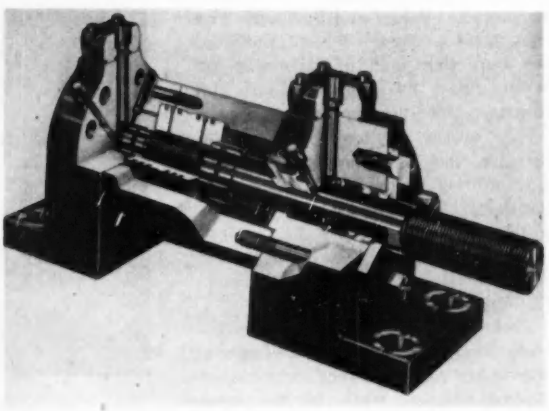
Extensive Cylinder Line

An extensive line of hydraulic cylinders being announced consists of more than 800 basic models, in 150-300, 2000, and 3000 psi ratings. A wide range of standard mountings are available.

H-P-M cylinders are available with male or female, single or double end piston rods, with or without cushion. In the 2000 and 3000 series cylinders there is a choice of standard or 2:1 piston rods. Also, in addition to the standard piston rods, which are of ground and polished steel, optional rods are available—chrome plated, hardened, or hardened and chrome plated.

The 300 series is designed for 150 psi air or 300 psi oil hydraulic service. The 2000 and 3000 series cylinders are designed and built for 2000 and 3000 psi oil hydraulic service respectively.

For easy reference, the H-P-M cylinder line is presented in three individually bound catalogs—catalog No. 701, covering 150 psi air and 300 psi oil hydraulic cylinders; catalog No. 721, covering 2000 psi cylinders and catalog No. 741, covering 3000 psi cylinders. *Write to Hydraulic Power Div., The Hydraulic Press Mfg. Co., Lincoln Ave., Mount Gilead, Ohio, indicating pressure range best suited to your requirements.*



One of the H-P-M hydraulic cylinders recently announced.

Deburrs Internals

A universal internal Burr-Master (BMI-14), designed for deburring and chamfering of internal splines, or straight sided or involute form helical or spur gears from ⅝ in. to 3½ in. pitch diameter, can handle nine to 42 teeth, depending on the tooth pitch. Its patented action chamfers both sides of the tooth and the root at one time at the rate of five teeth per sec.

Depth of cutting stroke is infinitely variable for maximum efficiency. Simple changeover enables production to be shifted from one gear to another with minimum time loss. The only tooling components that must be changed are: Spline driver, workholding fixture, tool holder and form tool and—if the number of teeth change—the change gears.

With a three or four cutting edge, circular-type form tool, when one cutting edge becomes dull the tool is rotated to present a sharp edge. No form grinding is required to sharpen tools.

In production, the part is loaded on the spline driver and is then fed forward onto the workholding fixture as the operator actuates the cycle control lever. Forward motion of the lever energizes the control circuit which starts the drive motor and the timer in the control panel. The timer is set for one complete revolution of the workpiece and causes an indicator to light up on the face of the control panel when the part is finished. The operator then reverses the control lever which stops the machine with the tools automatically in a retracted position. This same action removes the workpiece from the locator on the fixture so that the finished part can be removed from the spline driver. *Modern Industrial Engineering Co.*

Circle 57 on page 73 for more data

Tape Sticks to Oil

A newly developed pressure-sensitive labeling tape is claimed to adhere to oily as well as to dry metal surfaces. A special adhesive combines with oil to produce a firm bond, yet permits the tape to be stripped off any time without leaving a mark.

Developed principally for identifying, warning, and for every other labeling use, the new tape has a writing surface suitable for pencil, ink or crayon. *Labelon Tape Co., Inc.*

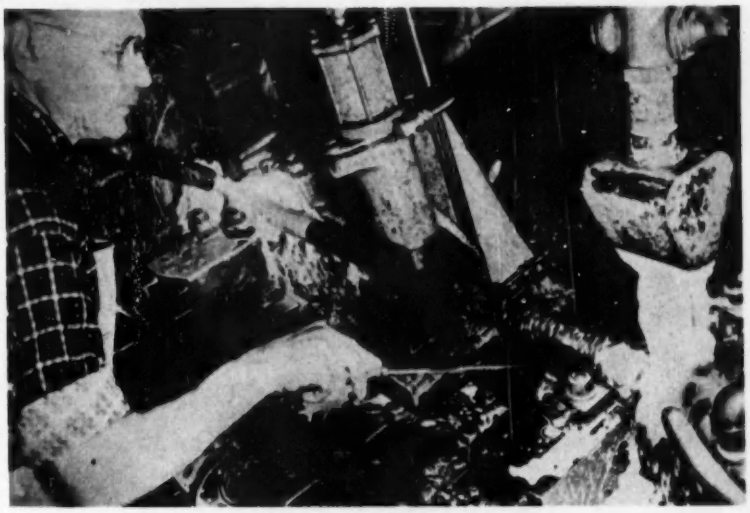
Circle 58 on page 73 for more data

Quartz I-R Lamp

A new type of infrared lamp comes in a compact tubular shape, slightly larger in diameter than a cigarette, rather than in the shape of a conventional bulb. The tube is made of fused translucent quartz.

Producing more than four times the energy concentration—100 watts per lighted inch of tube length—delivered by the popular 250-watt infrared bulb, the quartz lamp will withstand high temperatures and the shock of violent temperature changes. Lighted lengths are five and 10 in. *General Electric Co.*

Circle 60 on page 73 for more data



Medium-Duty Carbide in New Series

Grade 350 medium-duty, high wear-resistant steel cutting cemented carbide for light roughing and general finishing is said to provide up to 30 per cent better performance than existing carbides in this machining area, withstanding cutting temperatures up to 1800 F. Second cycle of automatic lathe is shown machining front and back faces of the flange end of a 48-in. truck axle with the grade 350 cemented carbide. The operation uses round and square insert type cutting tools, increasing the production run by more than one-third. (Carboloy Dept., General Electric Co.)

Circle 59 on page 73 for more data

Spindles

A redesigned line of motorized spindles and vertical spindle grinders includes three models — one with flat mounting pad only, another with vertical hand feed parallel to the spindle, and a third with vertical and horizontal feeds. Features include precision bearings, special design of motor, and all rotating parts dynamically balanced.

The feeds are available with crank handle or hand wheel, micrometer dial, with graduated swivel either on the motor mounting as related to the feeds, or for swiveling the entire assembly. Design permits mounting in any position. Motorized spindles and vertical spindle grinders are built in sizes ranging from ⅛ hp to 25 hp. *Standard Electrical Tool Co.*

Circle 61 on page 73 for more data

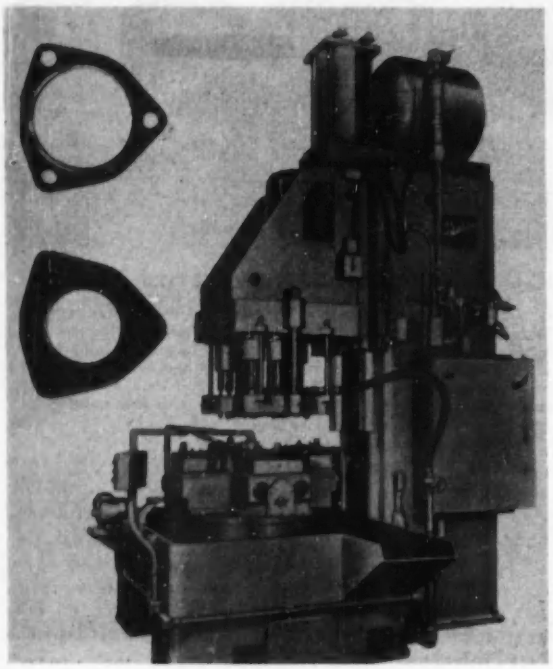
Air Tool Inserts Rollpins

For faster insertion of Rollpin fasteners, a power tool driving set has been developed for use with Ingersoll-Rand standard pneumatic aircraft riveting hammers. Held in the hammer by a beehive-type retainer, the driving head has a slot machined along one edge. For starting, the Rollpin is held in this slot. After the pin is started, driving may be shifted to a hole drilled in the face of the driving set. Pins may be driven flush or countersunk. (Elastic Stop Nut Co. of America.)

Circle 62 on page 73 for more data

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 73



A Buhr special with air balance system.

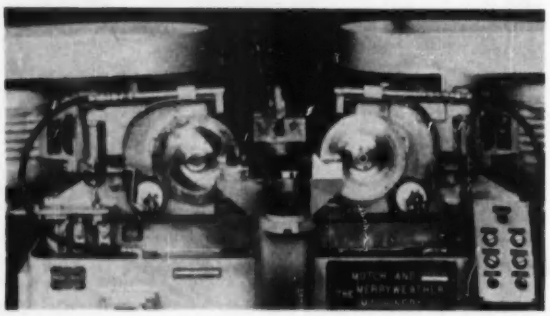
Air System of Counterbalance

To eliminate counterweight assemblies on vertical machines, an air balance system which operates at 50 lb line-pressure has been developed. The storage tank cuts air consumption to a minimum.

The machine is fully equipped with a safety device to guard against air failure or creepage during idleness. The special machine bores, drills and chamfers two automotive steel flanges at a time, at a rate of 329 pieces per hour gross. The holding fixture, mounted on an automatic index table, is arranged with hydraulic clamping. Parts are clamped while fixture moves from load station to first work station, and are unclamped during return from final work station to load station.

All vertical machines in the line are now designed so that they can be arranged either with air balance system or the conventional counterweight assembly. *Buhr Machine Tool Co.*

Circle 63 on page 73 for more data



The M&M connecting rod cap sawing machine.

Stable D-C Power

Zero to 15 volts d-c at a maximum of one ampere is the output furnished by the Type 3-132 power supply. Designed for the excitation of multiple strain gages and other resistance-type transducers, it may be used as a secondary reference voltage source in many other research, production, calibration and measurement applications. The 3-132 is also a convenient voltage supply for sensitive filaments in d-c amplifiers, recording lamps, and standard light sources.

Output impedance is less than 0.1 ohm; output drift, less than five mv per hour; and ripple, less than 1 mv peak-to-peak. A 10-volt change or transient in a 105 to 125-volt a-c line voltage causes less than 10-mv change in the output—a zero to one-ampere change in load causes less than 20-mv change. Either the positive or negative output terminal may be grounded, or the output may "float" free of the chassis. The high-gain circuit features a stable internal reference voltage to insure absolute regulation. Terminals are also provided for the connection of an external reference.

Merely plugging an accessory No. 3-002 stabilizing unit into the chassis socket, without need for further connections or adjustment, virtually eliminates all long-time instability or drift. Output drift is reduced to less than one mv in 24 hours, and the usual warm-up period is eliminated. Line-voltage changes or transients in the 105 to 125-volt range, or a load variation from zero to one amp, cause only five-mv or 0.1 per cent (whichever is smaller) change, over the entire output range. *Consolidated Engineering Corp.*

Circle 64 on page 73 for more data

Parting Cap from Rod

This machine which saws connecting rod forgings when rod and cap are one piece, consists of right-hand and left-hand sawing heads mounted on hardened steel ways, carrying high speed steel triple-chip blades which are fed by means of hydraulic cylinders simultaneously from each side.

The part is located with a locating pin in the machined pin end of the connecting rod, and clamped hydraulically between hardened blocks at the crank end. Clamping, sawing, and releasing is automatic. *The Motch & Merryweather Machinery Co.*

Circle 65 on page 73 for more data

Skid Box Folds

A lightweight collapsible steel box and skid unit for shipping, Collaps-a-tainer combines the features of strength, lightweight, and compactness. Constructed of 18 gage steel throughout with 16 gage reinforcements, the 100-lb box has inside dimensions 30 in. square. Two pins on opposite corners pull out so sides can fold on the 3½-in. pallet. *Republic Steel Corp., Pressed Steel Div.*

Circle 66 on page 73 for more data

Air Slide Feed

An air operated slide feed for hydraulic presses features an open throat that will feed stock in any width as well as wire and tubing.

Air operation is said to give extreme accuracy of feed, quiet operation with no shock, faster setting up in any position and easy interchangeability from one press to another. The unit is self-contained, operating on standard shop air line pressures. It has a positive stock control clamp, single motion gripping action, a simple screw adjustment to control the rate of feed and a self-contained hydraulic cushion. *Cooper Weymouth, Inc.*

Circle 67 on page 73 for more data

Adds Charger Line

The Precision-Charge line of battery chargers has been introduced with a charger for Edison industrial truck batteries. Three models are available to cover charging requirements for batteries of 10 to 42 cells. They give a constant-current charge.

A time control automatically starts the motor-generator unit, connects the battery to the charging circuit and stops the unit when the battery is fully charged. A completely discharged battery can be brought up to full charge in seven hours. Batteries are fully protected during the charging cycle in case of power failure. *Lincoln Electric Co.*

Circle 68 on page 73 for more data

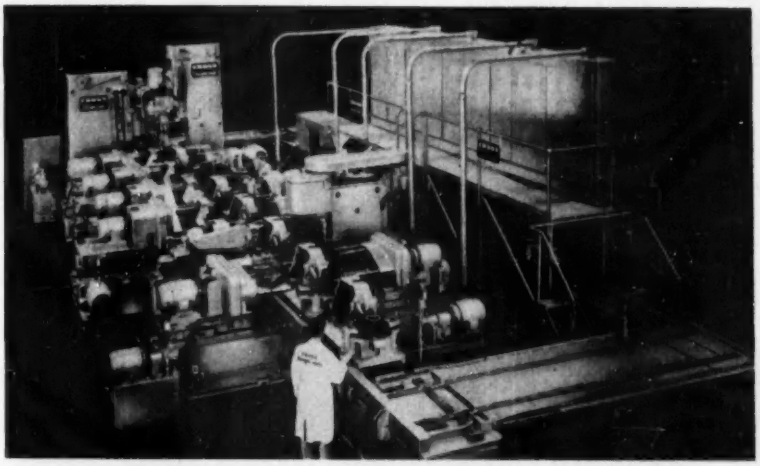
Air Filter

The Roll-O-Matic is an automatic self-cleaning air filter introducing a new adaption of glass fiber filtering media. It is designed to clean both outside and recirculated air. This filter combines the simple operation and convenient maintenance of the dry type with the large dust holding capacity and higher allowable operating resistance of the viscous impingement type.

Filtering media is a continuous length of fiber glass material supplied in 70-ft rolls. A pressure switch sensitive to the resistance differential across the filter curtain actuates a drive motor that rotates the screen and feeds a certain amount of clean media into the filter curtain when the resistance reaches a predetermined point. Field tests indicate that under normal operating conditions a single roll of media should be a year's supply per 10,000 cfm of filter capacity.

The unit is made in vertical sections three, four and five ft wide and in heights from five to 15 ft. *American Air Filter Co.*

Circle 70 on page 73 for more data



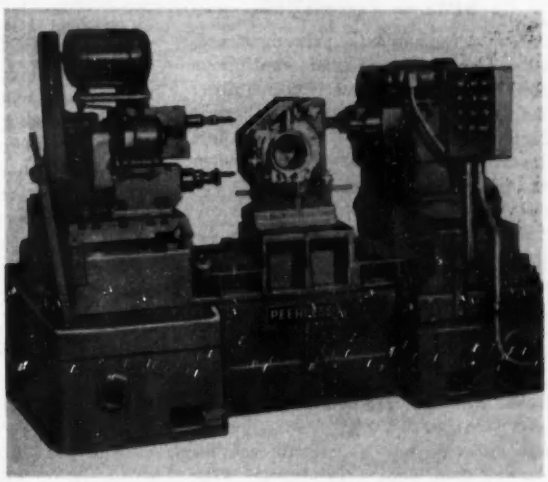
Fixtures, Chips Automated on Carrier Machining

Transfer-matic for milling, drilling and tapping two-speed truck axle carriers has been delivered to the Axle Div. of Eaton Manufacturing Co. With capacity for both spiral bevel and hypoid type carriers, the machine processes 53 parts per hour at 100 per cent efficiency. There are nine stations, seven for machining. A total of 97 operations are performed: 60 drilling, chamfering and reaming; five milling; four spotfacing and counterboring; 28 tapping. Two-position, progressive type work holding fixtures are transferred automatically from station to station and return. Features include a cleaning unit for removing chips from fixtures between unloading and loading stations. (Cross Co.)

Circle 69 on page 73 for more data

Housings Precision Bored

A double-end precision boring machine recently delivered to process pump housing assemblies features a hydraulically-actuated cross-slide. High precision is said to be assured with a power-operated mechanical take-off device which also clamps the slide in position during the machining cycle. This device permits boring close-center-distance holes in a single setup without sacrificing the benefits of one-time-part fixturing and longitudinal platen travel. The machine performs boring, chamfering and trepanning operations to precise specifications, at 30 per hour at 100 per cent efficiency. Tooling features a single-place fixture with manual clamping. (Peerless Production Co.)



Circle 71 on page 73 for more data

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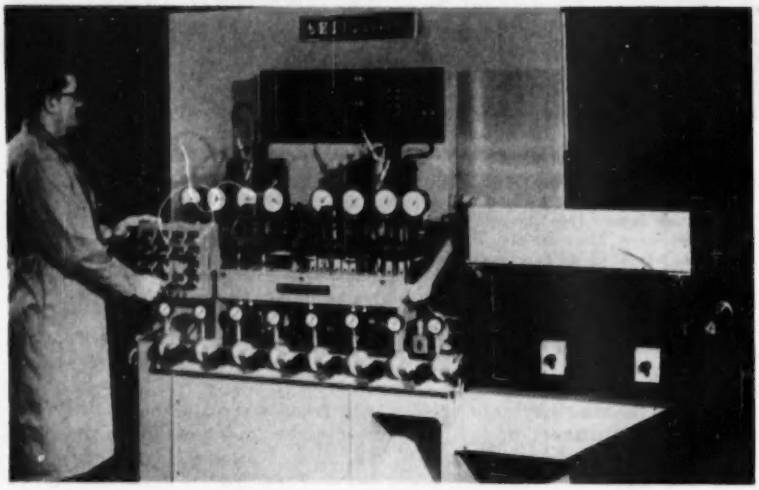
For additional information, please use postage-free reply card on page 73

Checks Rods Automatically



An automatic gaging machine for connecting rods, checks bend, twist, and hole size and taper. Rejects are ejected automatically. The part is progressed automatically through a safety station into gaging position by an air motor driven chain-type conveyor. In the first gaging station two air gaging spindles, ball slide mounted, automatically enter the piston pin hole and crank pin hole for gaging bend and twist. The bend and twist are indicated by differential heads operating lights. At the second station two air gaging spindles automatically enter the two holes for gaging diameter and taper, indicated by lights. Acceptable parts are classified according to piston pin hole size in four classifications, and color coated. Production range is 1700 pieces per hour. (Sheffield Corp.)

Circle 72 on page 73 for more data

Sets C Potential

A new Carbotronik instrument provides an accurate and continuous method of automatically controlling the carbon potential of endothermic furnace atmospheres. The new unit assures uniform heat treating when adding carburizing gas to a wide variety of heat treating operations including carburizing, carbonitriding, carbon restoration, annealing, normalizing, and hardening.

Functioning electronically, the unit continuously indicates, records, and controls furnace atmosphere carbon potential according to a setting selected ranging from 0.20 to 1.25 per cent carbon. With endothermic atmospheres the Carbotronik couples the dew point control instrument with the furnace temperature control, thus automatically correcting for temperature variables. The dew point controller, when used in this system, is graduated in terms of carburizing potential on a logarithmic scale from 0.10 to 1.25 carbon, rather than as dew point temperature. Control of the carburizing potential of the furnace atmosphere is achieved by using the instrument to throttle the flow of raw natural gas being added to the furnace atmosphere. *Ipsen Industries, Inc.*

Circle 73 on page 73 for more data

Rugged Holder

A heavy duty tool block to replace the round tool post has been approved for L&S lathes. The Aloris quick change block fits the top slide T slot of the lathe, and is locked in position with a lock nut. Vertical dovetails on two faces take tool bit holders for cutting or drilling. Bit holders are locked in with a cam handle, having been preset for height with an adjustable screw stop. *The Lodge & Shipley Co.*

Circle 74 on page 73 for more data

Coolant Hose

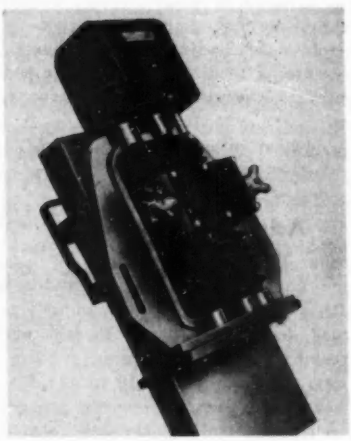
Flex-Set plastic coolant assembly bends into and keeps any form until changed. This hose is said to be free from clogging, corrosion, leakage, or change in position by vibrations or coolant pressure. *Couse & Bolten Co.*

Circle 75 on page 73 for more data

Applies Compound

An air-operated automatic buffing compound applicator that will accommodate bars up to ten in. wide (two in. thick) is the ninth model available in a series.

The model 610 applicator can be installed on all types of buffing machines from simple lathes to multi-operation automatics. Light weight construction permits installation on floating heads without disturbing balance. It can be installed in any position.



Nankervis automatic compound applicator.

The applicator can feed any number of strokes per minute. For example, it can be installed so as to apply compound only during the buffing cycle. Feed rate is adjustable. In addition, it is also possible to operate up to eight applicators simultaneously from a single controlling valve. *George L. Nankervis Co.*

Circle 76 on page 73 for more data

Self-Cleaning Dust Collector

An automatic, self-cleaning dust collector, the Cyclo-Filter, is designed to handle all types of dust, including abrasive and fibrous materials for long periods, while maintaining constant volume and uniform air flow. Three models provide 400 to 5000 cfm of capacity.

Approximately 75 to 90 per cent of the dust is removed by cyclonic action. This partially cleaned air then flows through a series of cloth filter tubes, where the remaining dust is trapped. A reverse air jet scavenges three tubes at a time, while 33 others are collecting dust. Dimensions are four ft diam by 11 to 15 ft high. *Torit Mfg. Co.*

Circle 77 on page 73 for more data

Dual Lubricator

The 700 series automatic conveyor lubricator line injects a controlled volume of either grease or oil to trolley wheel bearings. Model 702 lubricates one side of the conveyor only; Model 704 lubricates both sides of a mono-rail conveyor. The lubricator is a self-contained unit which is mounted on the trolley rail and actuated by the moving conveyor. As a trolley wheel approaches the lubricator, the hub engages the nozzle of the pumping unit which is then automatically brought into contact with the grease fitting. *J. N. Fauver Co.*

Circle 78 on page 73 for more data

Nesting Box

A newly designed nesting stacking box provides a six-in. nesting clearance between box tops. Loaded boxes may be stacked by crane or fork truck by simply lifting, turning and tiering on the lower box. Made either with two corrugated sides and ends or both ends of expanded metal, inside dimensions are 45 in. long, 36 in. wide, 23 in. deep. Weight is approximately 190 lb, with 4000 lb capacity. They are of all-welded construction, designed for heavy duty applications. *Palmer-Shile Co.*

Circle 79 on page 73 for more data

Gas Control

The Carbo-Guard, a packaged unit for measuring and controlling the flow of carrier gas and enriching gas, is designed for use with any type of carburizing furnace—pit, box, muffle or radiant tube. It includes control valves built into the tops of the two flow meters where the operator can read and adjust, if necessary, the volume of carrier and enriching gas flowing to the furnace work chamber. All spoilage due to too little or too much gas is said to be eliminated.

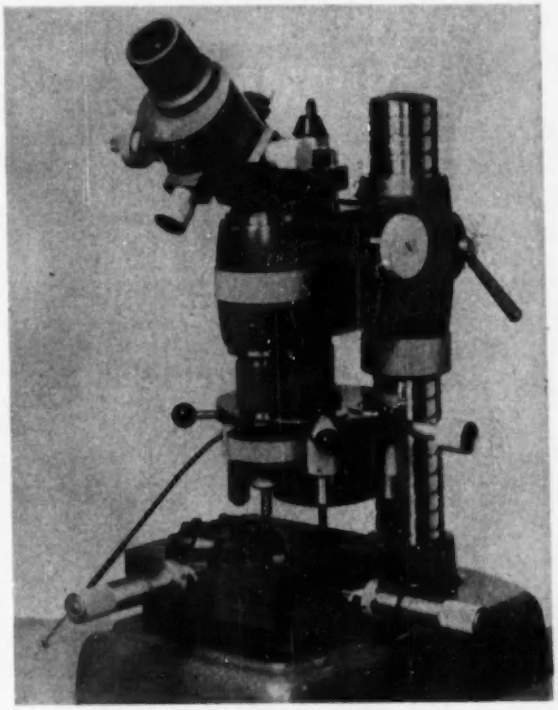
The unit includes a mixing manifold with outlet connections at both ends. It is available in ten sizes. It is easy to read because the oil contained in the glass tube of the two flow meters prevents accumulation of dirt and other foreign matter which might obliterate portions of the scale. *Waukee Engineering Co.*

Circle 81 on page 73 for more data

Delicate Testing

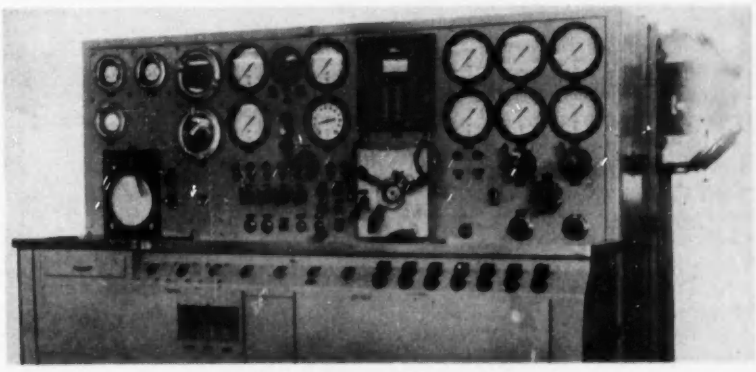
A portable hardness testing instrument makes scratches or impressions which cannot be seen with the naked eye. Design combines positive controlled diamond penetrating action with 400X microscope, which is swung directly over the impression to read the hardness by measuring with a reticule scale and vernier to 0.0005 mm. Tables convert readings into Rockwell and other scales. Also coarse impressions such as Brinnel ball test may be made. (George Scherr Co., Inc.)

Circle 80 on page 73 for more data



Checks Jet Fuel Regulator

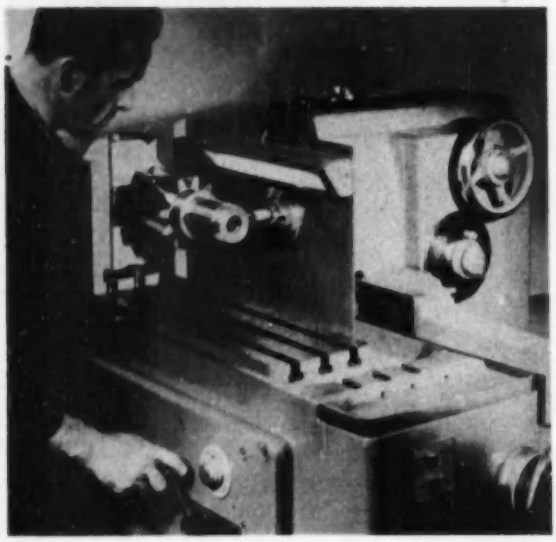
This test stand checks the performance of PE3A fuel regulators of the General Electric J73 turbojet engine, by simulating mechanical, hydraulic, pneumatic, thermal, and electrical conditions which affect performance. Components include the flowmeter panel mounting three in-line flowmeters with range from 126 to 18,000 lb per hr, three similarly ranged fuel discharge line flowmeters, and their complementary low flow by-pass valves, electrical control cabinet, GE Thymotrol transformer and control cabinet, and electronic counter control unit which is accurate to plus or minus one rpm. (Greer Hydraulics, Inc.)



Circle 82 on page 73 for more data

NEW EQUIPMENT — PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 73



Fifteen spindle speeds are provided, from 90-2240 rpm on the Hurth LF32. Longitudinal feed or milling carriage has 12 rates, in either of two ranges. Return feed rates can be set for either the same as longitudinal rates or for five times these values. Five speeds are provided for rapid carriage traverse.

Automatic Spline Milling Machine

Keyways, splines and slots can be accurately milled at rates said to be three to four times as high as those possible with conventional methods, by means of the cyclic operating principle incorporated in the Hurth LF 32 semi-automatic machine. The spindle is alternately raised and lowered against set stops, which can be adjusted to very fine tolerances. Vertical displacement of the oscillating movement of the spindle can be adjusted from 0.08 in. to zero. Lowering and raising of spindle are hydraulically controlled.

Operation is automatic except for chucking and removal of workpieces. When the starting button is pushed, the milling cutter is fed toward the workpiece in rapid traverse. Just before touching the workpiece, the spindle is switched to boring feed until the predetermined depth of cut is reached. The spindle is then lowered against the first set stop, and the carriage traverses to the end of the slot. Spindle is then raised against the upper set stop and return traverse begins. When carriage reaches the starting point, spindle is lowered to the mid-point of the slot. Spindle sleeve is retracted in rapid traverse and the milling spindle stops.

The milling carriage has a maximum horizontal movement of 15 in. Maximum manual vertical adjustment is four in.; automatic vertical adjustment is from 0 to 0.075 in. per minute. Work table size is 47¼ in. by 15 in. Maximum diameter of milling cutter is 1½ in. *Kurt Orban Co.*

Circle 83 on page 73 for more data

Truarc Dispenser

A dispenser for Truarc crescent and E-shaped retaining rings was introduced recently. A base which may be secured to the top of a bench accepts a bracket assembly for each size of retaining ring. Rings are extracted from the bottom of the stack with a patented applicator, either straight or offset. *Truarc Div., Waldes Kohinoor, Inc.*

Circle 84 on page 73 for more data

Filter System

A settling and filtering unit designed primarily for the filtration of relatively small solids permits continuous removal of chips, heavy solids and relatively fine solids to 0.004 in. screening.

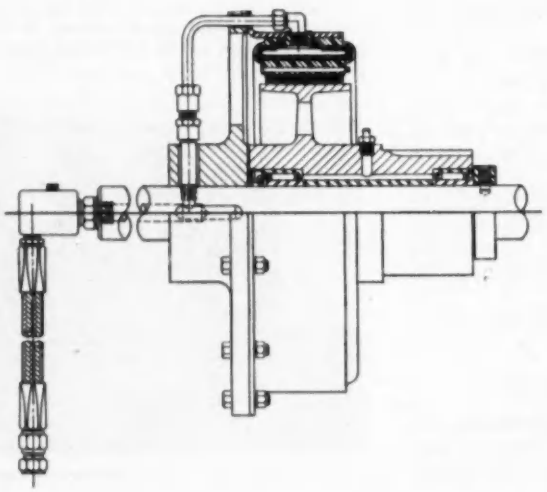
Expelling settled solids with chain driven flights reduces the volume of solids to be removed by the filter screen. Filter screens are continuously cleaned by brushes which also serve as flights and aid in the removing and expelling of settled solids. *Industrial Filtration Co.*

Circle 85 on page 73 for more data

Mg Hand Truck

Newest addition to a line of magnesium hand trucks is model No. 12-H-802, rated to handle loads of up to 450 lb. It weighs only 16 lb when equipped with rubber-tired magnesium wheels; 20 lb when equipped with standard semi-pneumatic tires. Standard Magliner component parts can be replaced from stock since there is no welding. *Magline Inc.*

Circle 86 on page 73 for more data



Small Clutch

A smaller edition of its line of Air Ring clutches is now available for machine tools, in sizes 6 to 14, or three to 31 hp., 2000 to 19,700 in.-lb torque. The line features standard needle bearings, and sprocket, spline or pulley sizes which are standard. (Fawick Airflex Div., Federal Fawick Corp.)

Circle 87 on page 73 for more data

Materials and Processes for Tooling, Finishing, Cleaning

Tooling Resin

Hysol liquid resins, recently announced, are used in combination with fiber glass fabrics for the production of spotting racks, checking fixtures and assembly jigs. Multiple duplications can be made from original models. A kit is being sold that contains everything required for evaluation of reinforced tools, including complete instructions. *Houghton Laboratories, Inc.*

Circle 88 on page 73 for more data

Zn PO_4 Coating

CrysCoat SW, a zinc phosphate coating material for iron and steel, is designed for use in pressure-spray washing machines. It is said to provide a fine-grained dense and uniform zinc phosphate coating on iron and steel that meets U. S. Government specification Jan-C-490, Grade I, and similar specifications. The coating weight ranges from 180 to 220 mg per sq ft. One-minute application in the phosphating stage of a five-stage pressure-spray washing machine is usually sufficient to obtain the coating weight desired, it is reported. *Oakite Products, Inc.*

Circle 89 on page 73 for more data

Pressure Cleaner

Composition No. 161, an alkaline-type material designed to clean aluminum, steel and other metals in pressure-spray washing machines without objectionable foaming, is a white, free-flowing, powdered material that is completely soluble in water, free rinsing, and inhibited to provide safety to aluminum. Due to its built-in anti-foam properties, this material is also effective in the new, high-pressure-spray washing machines for cleaning steel and other metals, it is claimed. *Oakite Products, Inc.*

Circle 90 on page 73 for more data

Silicone Fluid

Viscasil Fluids, a new family of silicones, are said to be versatile enough to resist high temperatures and mechanical shear breakdown in automotive vibration dampers. They are said to pour more freely at temperature extremes than any other fluids known today. They are stable when exposed to heat at 300 F for thousands of hours.

Other outstanding characteristics ascribed to the new fluid family include unusual chemical inertness, superior release qualities, physical inertness and water repellency. *General Electric Co.*

Circle 91 on page 73 for more data

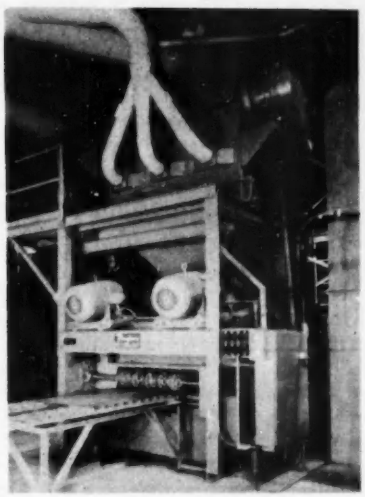
Phosphate Process

A new process makes it possible to phosphatize steel and still apply silicone finishes. The new process built around Divobond is claimed to clean, rustproof and give greater finish adherence to the metal all in one spray application. It is expected that the process will find general application as a one-shot cleaning, rust-proofing and paint-adhering process. It is claimed to operate over a wider pH range. *Divobond Dept., Diversey Corp.*

Circle 92 on page 73 for more data

Sheet Blaster

Model ES-503 Rotoblast machine will automatically clean steel sheet and plate up



to 54 in. wide at 20 to 80 lineal fpm. Two wheels throw 160,000 lb of abrasive per hour. A blow-off fan removes all abrasive from the sheet, and abrasive is reclaimed. (Pangborn Corp.)

Circle 93 on page 73 for more data

Silicone with Organics

A new silicone fluid, No. 555, which is remarkably compatible with organic materials is water white, odorless and easily diluted with such materials as lanolin, beeswax, mineral oil and 95 per cent ethanol. It shows considerable promise as a release agent for specialized applications, as an additive for paints and petroleum products, and as a plasticizer for certain rubbers, resins and plastics. *Dow Corning Corp.*

Circle 94 on page 73 for more data

High-Gloss Plastic Sheet

A process for producing a high-gloss surface on rigid sheets of extruded polystyrene has just been announced. Known as Chinatex because of its porcelain-like sheen, the sheet can be molded by the vacuum-forming process. One side has the new glossy finish while the other side has the standard egg shell surface. It is available in all colors. *Auburn Button Works.*

Circle 95 on page 73 for more data

Phenolic Finish

A material for finishing phenolic plastic, Logo Force P-85 is claimed to have improved hardness and adhesion over conventional materials without resulting in embrittlement on heat aging. It is available in both pigmented and pigmented metallic forms. *Logo, Inc.*

Circle 96 on page 73 for more data

Tooling Plastic

Improved metal-containing resins for industrial tooling are said to combine the manufacturing ease of cast plastics with the strength and dimensional stability of metals. They cure without pressure at moderate temperatures.

Plasti-Metal can be shaped into complex parts using both the casting and laminating techniques. It can be sawed, drilled, tapped, polished, etc., just like conventional non-ferrous metals. Special formulations are available which can be electroplated. *Aries Laboratories, Inc.*

Circle 97 on page 73 for more data

Glass Separator

A battery separator with an attached glass mat is said to offer improved resistance to vibration, decreased assembly costs and speedier production. According to the manufacturer, synthetic resin impregnated Darak separator with a glass mat attached to the ribs eliminates the hand labor normally required to insert a separate thin glass-fibre mat between the plates and separators of double insulated or premium batteries. Automatic burning equipment is used to join the plates into a cell group. *Almy Chemical Co.*

Circle 98 on page 73 for more data

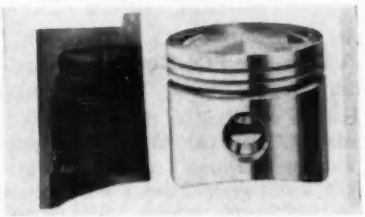
NEW PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 73

Extruded Piston in Production

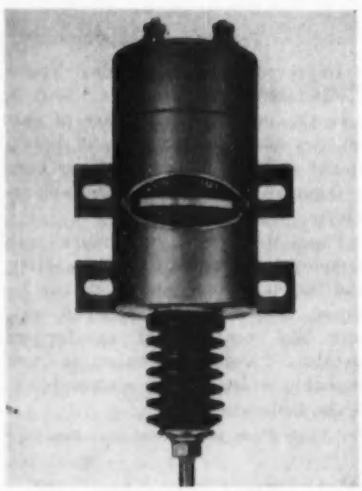
A one-shot method for impact-extruding pistons from slugs of casting type aluminum alloy is said to give a 50 per cent stronger part. Ductility and fatigue life are increased. Closer dimensions are held, and lighter walls can be made as a result. The Maxi-press operation is said to produce up to 500 pistons per hour. Although not finalized, the process is said to include heat up, one forging operation, one flash trim operation, and heat treat. *Thompson Products, Inc.*

Circle 36 on page 73 for more data



Engine Solenoid

Introduction of a continuous duty solenoid to a line of standard automatic and semi-automatic engine controls has been announced. Model SD



was especially developed to meet heavy duty requirements. It is fully enclosed in a sealed case to protect it from infiltration of dust and liquids.

SD solenoids can be furnished in all standard and special voltages up to 115 volts dc. Pull is 10 16 over 1½ in. stroke. Power consumption is 550 watts pulling and eight watts holding. Housing Dimensions are 4⅝ by 2½ in.

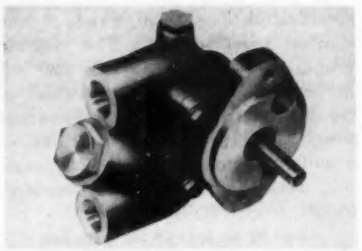
These solenoids are available with standard terminal screws or with the standard aircraft type AN connector. *Synchro-Start Products, Inc.*

Circle 41 on page 73 for more data

Steering Pump

A rugged hydraulic pump for power steering systems for heavy-duty on- and off-the-road vehicles provides a standard pressure relief setting of 750 psi with optional pressures to 1200 psi if desired. The pump incorporates the pressure-loaded principle which provides self adjustment for wear. *Pesco Products Div., Borg-Warner Corp.*

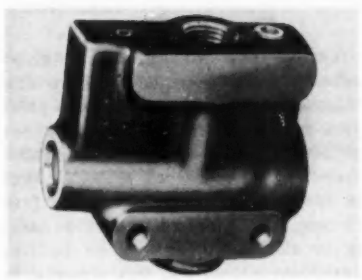
Circle 37 on page 73 for more data



Steering Valves

Flow control valves for power steering systems where the hydraulic pump does not include a valve, is now available. Model Series FM2 valves provide a relatively constant volume of oil to the booster regardless of engine speed variations. They are made in 2, 4, 6, 7 and 8 gpm capacities. An integral relief valve is set at approximately 1000 psi. *Vickers Inc.*

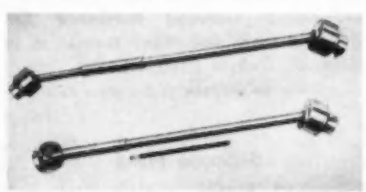
Circle 38 on page 73 for more data



Small C-V Joint

A miniature 40-deg, 2⅛-in. diam universal joint has been added to the line of Rzeppa constant velocity joints. One feature is an adjustable length shaft. *Joint Div., The Gear Grinding Machine Co.*

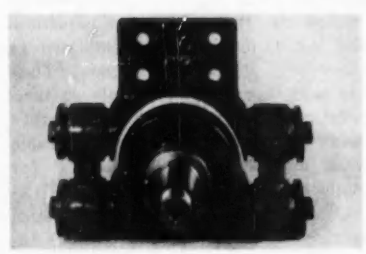
Circle 39 on page 73 for more data



Propeller Shaft Box

A truck propeller shaft support box, link-suspended, isolates shaft vibration from the chassis. It carries a deep groove ball bearing, uses frictionless seals, is interchangeable, and fits SAE standard stub ends. *SKF Industries, Inc.*

Circle 40 on page 73 for more data



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FREE LITERATURE

Thermometers 1

A 44-page catalog on remote bulb thermometers covers selection data, recorders and indicators, pneumatic control, electric control, psychrometers, bulbs, tubing and fittings. *Minneapolis-Honeywell Regulator Co., Industrial Div.*

Belt Conveyor Furnace 2

Eight-page booklet DB 28-420 on belt conveyor electric furnaces, designed for continuous bright hardening of carbon and alloy steel parts without oxidation or decarburization when used with an Endogas atmosphere and oil quench, is now available from the *Westinghouse Electric Corp.*

Specials 3

A 28-page catalog of specialized production equipment, in which 18 representative special machines are illustrated and detailed, will be supplemented from time to time with looseleaf inserts. *Peerless Production Co.*

Heavy Fork Truck 4

The Model F-39T10 electric powered, 10,000-lb capacity fork truck is illustrated and described in a new folder just released by *The Elwell-Parker Electric Co.*

Cast Bronzes 5

A 24-page illustrated booklet which presents the division's cast bronze and copper products for general industry, is available from *National Bearing Div., The American Brake Shoe Co.*

Air Tools 6

Catalog No. 61, describing a complete line of air tools for industry, is available from *Aro Equipment Corp.*

Stapler 7

Staple Queen packaging machine, a large semi-automatic model, closes center-slotted cartons top and bottom simultaneously, or will close tops only or bottoms only, as needed. Booklet Q-501. *International Staple & Machine Co.*

Cushions Tool 8

The Mech-Grip milling cutter and tool holder features a flexible tool clamping method, which is said to reduce entering shock and increase tool life. Six-page broadside gives details. *St. Clair Tool Corp.*

Tube Cutter 9

Faster operation is claimed for the Brehm system of shearing tubing. Four-page circular BTC-1-5M. *Steel Products Engineering Co.*

(Please turn page)

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Turbine Oils 10

Synthetic oils for aircraft turbine lubrication are discussed in detail in Vol. 40, No. 4 of Lubrication. *The Texas Co.*

Al Heat Treat

"Heat Treating Aluminum Alloys," 1954 revision, covers the subject in both non-technical and metallurgical terms. The 122-page 6 x 9-in. book is fully indexed, has 15 pages of tabular data, and covers both wrought and cast products. Write to *Reynolds Metals Co., 2500 S. Third St., Louisville, Ky.*

Loading Rubber 11

Load carrying capacity of rubber, static and dynamic modulus of elasticity—fifth in a series telling how the rubber industry runs its tests, is feature article in issue 58 of Neoprene Notebook. *Du Pont Co.*

Tool Supplier 12

Facilities to meet exacting requirements for tools, dies, jigs, fixtures, special machinery, and production contract work are displayed in a four-page folder. *Rockford Die and Tool Works, Inc.*

Balanced Con Rods 13

Details of several machines to mill connecting rods for balancing are given in four-page bulletin 2100. *The Motch & Merryweather Machinery Co.*

Cheaper Handling 14

How properly planned materials handling can reduce production costs is explained in a non-technical guide, "The Materials Handling Cost Cutter," published by the *Automatic Transportation Co.*

USE THIS POSTCARD

Job Lapping 15

Enlarged facilities for precision high-speed job lapping, in large or small runs in a wide size range, are described in booklet No. L-407. *Crane Packing Co.*

Electrical Modernization 16

A 16-page booklet on electrical modernization in industrial plants shows how a modern electrical system can increase output, lower operating cost, reduce down-time and maintenance, and increase safety and reduce safety protective rates. Booklet B-6133. *Westinghouse Electric Corp.*

Press Feeds 17

A condensed bulletin describes production feeding equipment for punch presses, automatic roll feeds, stock straighteners, and reel stands. *The Wittek Manufacturing Co.*

Select Cast Al

"The 10-Second Spec Rule" is a slide rule type device for selecting over 60 permanent mold and sand cast aluminum alloys, based on composition limits, specific and relative physical properties and mechanical properties. Write to *Howard Foundry Co., 1700 N. Kostner Ave., Chicago 39, Ill.*

Die Casting 18

A non-technical description of light-metal die casting techniques, views of the firm's production lines, and six case histories are included in a 24-page booklet. *Doehler-Jarvis, Div. of National Lead Co.*

Ceramics 19

Design principles for high temperature ceramics and a catalog of 11 wet extrusion and dry pressed ceramics listing over 25 properties are available in a four-page brochure. *Frenchtown Porcelain Co.*

Plastic First Investments 20

A file of data on machining polystyrene, especially for prototypes of investment castings, is offered by *Precision Metalsmiths, Inc.*

Aluminum Castings 21

A pictorial view of "manufactured" aluminum castings, from engineering to coring, molding, finishing, and laboratory control is given in a booklet offered by *Aluminum Alloys Corp.*

(*Turn to page 158, please*)

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...they can cut your production costs

Continental is the only manufacturer producing this outstanding Phillips fastening combination—bits, holders, and screws. Their development has finally made power driving really practical, even on finished parts.

They have cut fastening costs as much as 50% and Continental's HY-PRO-Phillips bits average 2 to 4 times longer life than any other . . . one actually drove over 1,000,000 screws. Yes, it's another Continental exclusive in an outstanding record of 50 years in business.

Put your fastening needs in experienced hands. Call direct today or contact your local distributor. Continental can help cut your production costs.

Manufacturers of HOLTITE Fastenings

CONTINENTAL SCREW COMPANY INC. 1904

50th Anniversary

CONTINENTAL SCREW COMPANY

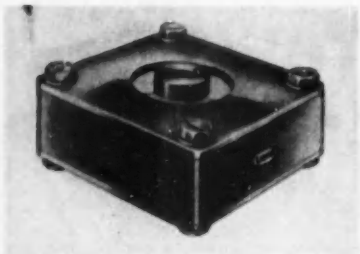
New Bedford, Mass., U. S. A.

NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 73

Damper

A vibration damper developed to provide the additional damping, in any direction, required in many vi-



bration control systems can be varied to fit the particular characteristics of the suspension system. This means that application of the new Unit Damper will reduce the amplitude at resonance, resulting in lower forces being transmitted to the mounted electronic or other equipment and tending to prolong mounting life. *Lord Manufacturing Co.*

Circle 46 on page 73 for more data

Manifolded Motor

Flexibilty of a line of aircraft type hydraulic motors is demonstrated by the new MS70-3915 model, used in the Douglas DC-7 cabin supercharger. A special head, or valve plate, is provided which includes an integral relief valve, a temperature bulb port, and two special ports for a circuit replenishing requirement. These features are in addition to the standard inlet and outlet ports. The new design results in the elimination of eight connections and two lengths of hose in the hydraulic circuit. The installation is simplier, cleaner, and a weight saving is effected. *Vickers, Inc.*

Circle 47 on page 73 for more data

Small Pump

An emergency oil pump, model RG-10430, weighs only 5.5 lb, including the electric motor, rotary gear pump, pump adapter and radio noise filter. Displacing ½ gal per min at 1000 psi, the unit is rated for intermittent duty of three min on, 20 min off when pump is operating at 1000 psi discharge pressure. On personal aircraft it operates at 500 psi with aircraft engine oil to actuate the propeller pitch. *Lear, Inc.*

Circle 48 on page 73 for more data

Mobile Rectifier

A new, heavy-duty mobile type power rectifier, with a 22-28 volt output adjustable in six steps, is now being manufactured. Though it is de-

signed for aircraft engine starting, ground operation of bomb bay doors and gun turrets as well as other plane components, it has uses in hangars, airfields, aircraft and general industrial plants as well as in the marine field. It is ideal for testing d-c control circuits and battery charging. *American Rectifier Corp.*

Circle 49 on page 73 for more data

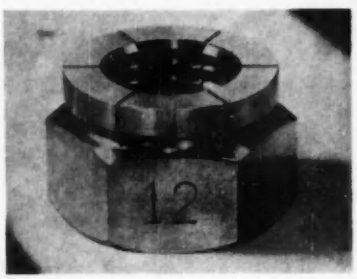
Oil Hose

Plastic hose made from fluorocarbon resins and capable of handling the newly developed synthetic oils, is now available. It is said to stand up well under high temperatures, and to overcome problems of corrosion. *Resistoflex Corp.*

Circle 50 on page 73 for more data

Lock Nut for Hot Jobs

Flexloc self-locking nuts which resist temperatures up to 1200F (series 99F12) are designed for such applications as tail cones, exhaust manifold systems, furnaces and firewall assemblies. Machined from AMS-5642 stainless steel, they are heat and

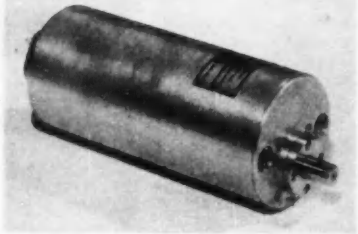


corrosion resistant and retain full locking strength at elevated temperatures. They are silver plated and conform to military specification MIL-N-7873. *Standard Pressed Steel Co.*

Circle 51 on page 73 for more data

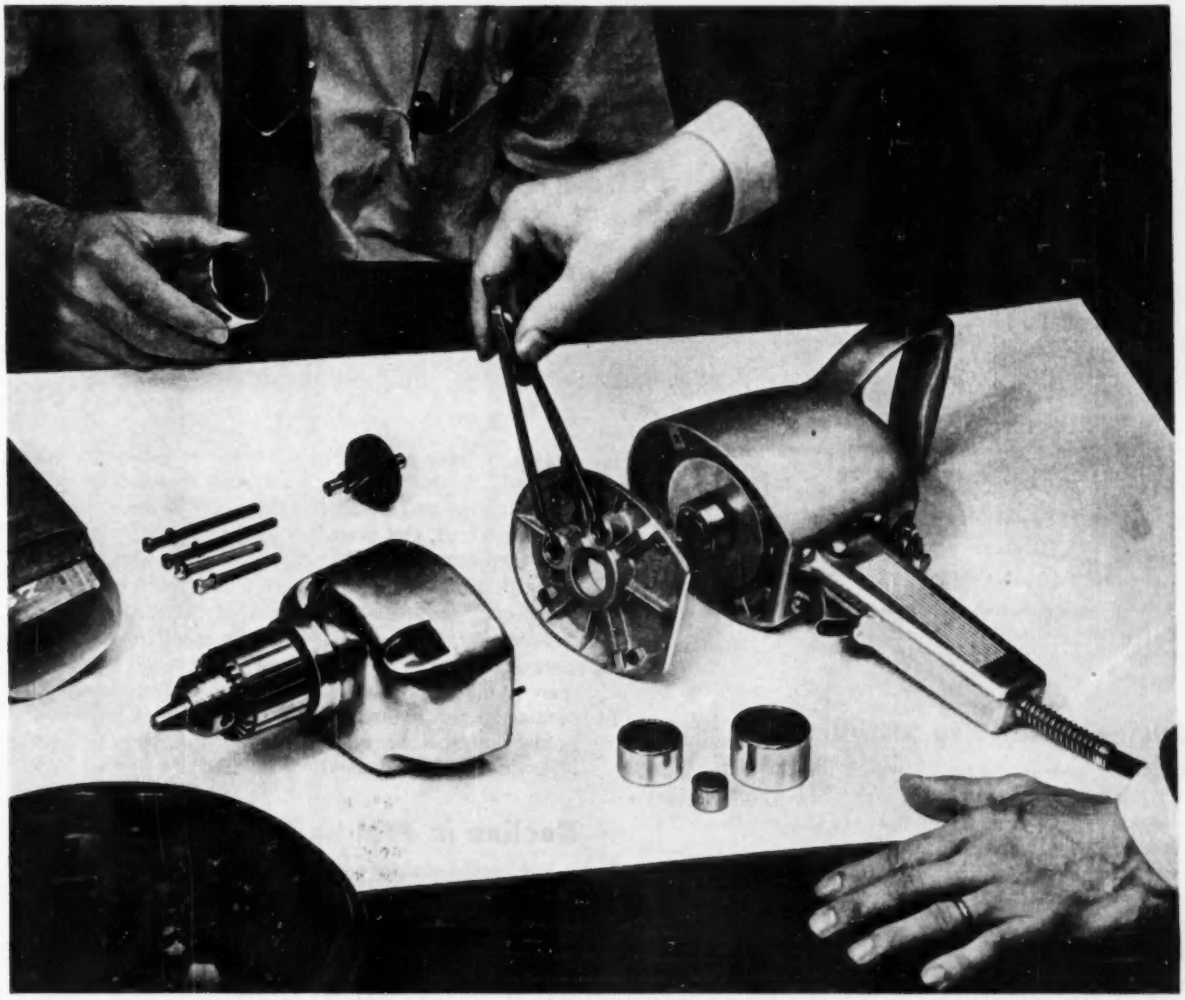
Smallest Actuator

A miniature high torque rotary actuator is said to be the smallest



available for its capacity, up to 2000 in.-oz. Dimensions are two in. by 5 1/16 in. Models with various speeds, torques, angular rotation, and voltages can be supplied for special applications of all kinds. *Globe Industries, Inc.*

Circle 52 on page 73 for more data



Cummins Portable Electric Drill—product of John Oster Manufacturing Co., Milwaukee, Wis.

"See how NEEDLE BEARINGS Simplify Design"

Torrington DC Needle Bearings have a talent for simplifying complex design problems.

Because of their small size, housings and related members can be made smaller and lighter, shaft diameters can be increased for added strength, and smaller shaft-center distances can be employed.

These benefits are a direct result of the Needle Bearing's unit construction. The drawn and hardened outer shell, when pressed into a recommended housing bore, serves as the outer race. A full complement of small-diameter rollers provides many lines of contact for high radial loading. What's more, a hardened shaft serves as a low cost, high quality inner race.

The turned-in lips of the Needle Bearing retain lubricants effectively and help insure long service life.

Why not incorporate these advantages into your product? Our engineering staff will be glad to help you with your anti-friction problems.

• • •

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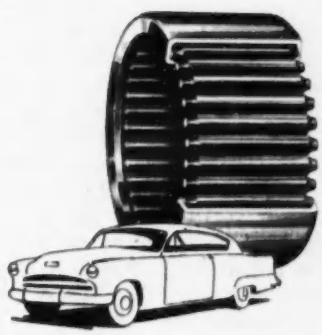
Torrington, Conn. • South Bend 21, Ind.



America's leading automobile makers use millions of Torrington Needle Bearings a year in steering gears, transmissions, universal joints and many other assemblies. Needle Bearings install easily, give long service life, help contribute to safer handling, smoother riding and braking to cars and trucks.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON NEEDLE BEARINGS

Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers

The BUSINESS PULSE

Business Volume May Take Upturn in Near Future. Retail Sales Increase But Industrial Production Falls Off Slightly as Inventory Liquidation Continues. Very Slight Personal Income Decrease During Recent Months.

This Survey is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York

Business Activity Stabilized?

Evidence keeps piling up which indicates that business activity has stabilized. Even the more cautious analysts now seem to agree that the decline has ended, at least temporarily. Industrial production is no longer slipping, conditions in the labor market have improved, the rate of decline in personal income has slowed, manufacturers' new orders have turned upward, and figures on end-product demand make good reading. Moreover, there appears to be a good possibility of at least a moderate upturn in aggregate business volume in the period immediately ahead, to judge from developments in key industries. Construction activity is still booming, steel operating rates have begun to show improvement, textile markets are steadier, and there is evidence of increasing demand for some of the more important nonferrous metals.

In attempting to evaluate the scattered signs of revival that have appeared, one needs to keep several qualifying considerations in mind. First, the improved demand for steel has to be judged in the light of the collective bargaining that is now in process in that industry. It has to be recognized that some part of the increase in steel ordering may be attributable to the fear of a strike this summer. Thus far there is no substantial evidence that strike considerations have been important, but such a judgment could be mistaken. Secondly—and this is perhaps a more important consideration—there is the possibility that business performance in recent weeks may have been influenced by the threat of United States involvement in Indo-China. There is no satisfactory way of gaging an intangible of this sort, but it does have to be noted.

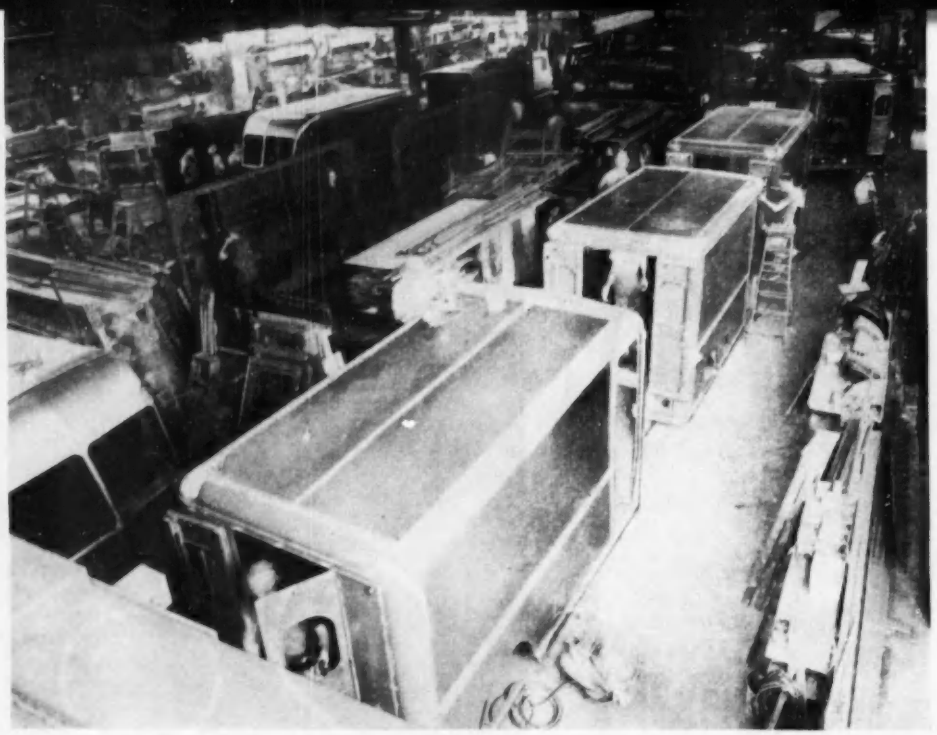
Looking ahead to the second half of the year, a still more basic question needs to be considered. What industries are likely to show expansion in sufficient degree to have a material influence on gross national product? It can be plausibly argued that construction expenditures will hold up, that plant investment will be maintained, and even that aggressive selling efforts will keep output and distribution of automobiles and other durables at high levels. But where is there a prospect of appreciable expansion? The fact is that expansionary potentialities are not readily discernible, suggesting that revival is more likely to be a gradual than a quick process. There seems little reason to assume, for example, that the 1953 peak of industrial production will be regained this year, barring new international involvement.

Decline in Jobless Total

The recent stability of business shows up in a wide range of indicators. Statistics for April reveal the first decline in the jobless total since last October. As of the mid-month sample date the Census Bureau estimated that some 3.5 million persons were unemployed, 260,000 less than a month earlier. This improvement reduced the proportion of all civilian workers out of jobs from 5.8 per cent to 5.4 per cent. It seems quite probable that there has been some further improvement since mid-April, but there remains the strong possibility of a fairly marked seasonal increase in unemployment in the summer months, when students enter the labor force.

In April the Federal Reserve Board's index of industrial production ended the long decline that had been in progress since last summer. It held at 123 per cent of the 1947-49 average, approximately 10 per cent below the 1953 peak. The rate of decline had slowed appreciably in the first quarter of this year as compared with the latter part of 1953, suggesting that the steadiness in April was not merely a freak statistical occurrence but rather was part of a well-defined pattern. April figures are particularly encouraging in that they reveal stability in all categories, including durables. In the first three months of the year nondurables and minerals were stable, but durables persisted downward. Weekly statistics for May suggest that there is a good possibility that the adjusted index number for that month, when released, will show a small rise.

(*Turn to page* 106, *please*)



View of the production floor in the compact shop. Bodies are built on dollies which roll on tracks around the line. Jigs are shown between the assembly lines. With this setup, Boyertown turns out 15 bodies per day.

FLEXIBILITY . . .

for Producing Customized Truck Bodies

ONE of the requirements for the small truck-body manufacturer to economically produce a variety of body models for the automotive trade is versatility. This qualification is displayed by the Boyertown Auto Body Co., Boyertown, Pa., which manufactures and markets 17 basic body designs with more than 100 customized production variations for the fleet field, and in addition builds special bodies. Most of the bodies built by the organization are placed on Chevrolet, Dodge, Ford, GMC, and International chassis for delivery type service.

While the production of all delivery body manufacturers is relatively small by comparison with chassis manufacturers, Boyertown is one of the largest in its field. Approximately 500 shop employees at Boyertown build some 15 commercial delivery bodies per day. Boyertown also has extensive Government contracts for mobile machine shops, expandable vans, etc. The dollar volume of these is about equal to that of the industrial commercial production.

One of the features of the production setup which permits Boyertown to offer a large number of body styles competitive with the market is the use of special jigs. These jigs are designed for rapid changeover and it is possible to produce up to 10 different models with the same body jig. The jigs have been built with a variety of notches and stringers corresponding to the models so that any particular body type can be laid out in fast order. It is only necessary to utilize different toggle clamps and C clamps to hold the work in place.

The production line at Boyertown is equipped with dual tracks along the floor. Bodies are built up on dollies, which are set on the track, so that the work flows along the production line to each work station. Manpower is used to move the work-in-process from one station to the next.

All of the sheet metal components used in the body shall are of hi-tensile steel, Mayari R, Cor Ten, etc. Boyertown engineers claim that up to 750 lb more payload can be carried in their new bodies of the hi-tensile alloy than in the former production models.

Although hi-tensile steel has a rather high rust resistance factor, every sheet metal body piece is heavily coated with zinc chromate before assembly. When welding is used to join the pieces, the joints are painted over with the preservative. When rivets or bolts are used as a means of joining parts, Aluminastic is placed in between the sheets of metal to make the joint water-tight and rattle-free. Finished bodies are also thoroughly undercoated.

Tooling for the production of the sheet metal components consists primarily of Wysong and Chicago

(*Turn to page* 156, *please*)

SAME MATERIAL—SAME SPECIFICATIONS

Why did one of these parts cost twice as much to machine?

The answer may well show up in *your* production costs. The surface finish on the part at the left was *controlled*, using a Brush SURFINDICATOR*, to meet specifications. The surface finish on the other part was *guessed at* and the part was overfinished, exceeding specifications. Cost data shows that furnishing a 32 microinch finish, where a 125 microinch finish would be satisfactory, *doubles* the machining cost.

You no longer have to guess at surface roughness and spend needless money in overfinishing. The Brush SURFINDICATOR permits you to measure surface roughness easily and quickly on the production line. Laboratory techniques are not required — your shop personnel can quickly learn to make accurate measurements after brief instruction.

TRY IT YOURSELF! Write for a copy of this booklet. It describes how surface finish control can reduce your machining costs, increase production capacity and help improve your products. Better yet, ask for a demonstration of the SURFINDICATOR in your plant, by a Brush engineering representative. Send coupon now. Brush representatives are located throughout the U. S. In Canada: A. C. Wickman, Ltd., Toronto. Brush Electronics Co., Cleveland 14, Ohio.

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INDUSTRIAL AND RESEARCH INSTRUMENTS
PIEZO-ELECTRIC MATERIALS • ACOUSTIC DEVICES
MAGNETIC RECORDING EQUIPMENT
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The Brush SURFINDICATOR is easy to use, portable and accurate. It can be set up anywhere in the plant where 115 volts a.c. is available. The operator simply guides the pickup over the part, and reads surface roughness in microinches on the meter.

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☐ Please send free copy of "Surface Finish Control".

☐ Have your nearest representative demonstrate the portable SURFINDICATOR to me.

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*City*_____ *State*_____

AIR BRIEFS

By ROBERT McLARREN

Supersonic Bomber

The world's first supersonic bomber has finally been given the "go ahead" by the Air Force. Decision to place the supersonic Convair XB-58 Hustler into production has been delayed a year by high-level debate on its anticipated development cost of several hundred million dollars. It is the Hustler project that will serve as the guinea pig for the Air Force's highly-publicized weapons system concept in which Convair will serve as the single prime contractor with all suppliers reporting directly to the joint Convair-USAF project office. The four-engine, delta-wing bomber will be powered by four 15,000-lb thrust jet engines in pods, although the choice between the General Electric J79 and the Pratt & Whitney J75, both in this thrust class, cannot yet be made. Meanwhile, Convair has let subcontracts to the Emerson Electric Co. for the armament system, Sylvania Corp. for radar system, Sperry Gyroscope for the navigation system and Bendix Corp. for the autopilot control system.

U.S. Jet Transport—At Last

The "on-again – off-again" U. S. civil jet transport story of the past five years has come to an end with completion of the mighty Boeing 707 Jet Stratoliner. No longer a conversation piece, the physical article is now in being, resplendent in its yellow-and-brown paint job. Two months ahead of schedule, the four-jet, swept-wing transport may be back on schedule due to collapse of the left main landing gear during ground taxi tests at the Renton, Wash., plant. The accident caused damage to the jet engine pods and wing and flaps—but Boeing officials characterize it as minor and even say the light damage to the wing is a tribute to the pod-mounted engines. Assuredly it is the wildest coincidence that the Air Research and Development Command has issued a request for bids for a jet tanker transport almost simultaneously with completion of the new 707, which was also dubbed the Jet Stratotanker in probably the only two-name christening of a vessel (air or sea) in history. Boeing still stoutly denies any orders—civil or military—for the brilliant new jet transport.

Money to Spend

It now appears the Air Force may arrive at June 30, 1954, with even more than the previously estimated $3,691 million in unobligated funds. At the end of March (the last figure available), the USAF had $5,867 million on hand and it will have to sign contracts at the rate of about $700 million a month if the unobligated total is to drop to the $3,691 million estimated. Observers doubt that contracts in this amount can be let, for the highest monthly total during the first nine months of the current fiscal year was only $230 million in March. Navy is also lagging behind in its contract-letting with an unobligated balance of $1,1447 million at the end of March. Navy estimates a fiscal year end total unobligated of $500 million but to meet this figure Navy will have to obligate more than $300 million a month during April, May and June, whereas previous high was only $118 million last September. It's a little difficult to reconcile consistent industry complaints of "leveling off" in their business with these billions going begging. However, the reason for the delay is given in official parlance as "delays in programming" and insist they can't place contracts until the desired products fully meet specifications which, in many cases, isn't being realized. On July 1 nine billions more in new fiscal '55 money will become available.

BLC Arrives

Boundary layer control, the acceleration of the slow-moving layer of air next to the surface of an airplane, is a 50-year-old idea but is receiving its first full-scale tests this year. The Navy reveals that it had been flying a Grumman F9F-4 Panther jet fighter from the *U.S.S. Bennington* (before the tragic explosion aboard that carrier). The Panther system consists of piping high-pressure air from the jet engine compressor to a series of outlets near the wing trailing edge. This high-pressure air accelerates the slow air along the wing trailing edge, resulting in an increase of 3000 lb in the airplane's lifting ability or a 20-knot decrease in its landing speed. The Navy says, too, that the system can be adapted to Panthers already in service. The Air Force plans to apply boundary layer control to the first three Fairchild C-123 transports. They will be flown to Stroukoff Aircraft Corp., Trenton, N. J., who will make the installation. Stroukoff, designer of the airplane and builder of the prototype before the Stroukoff-Kaiser dissolution, has been developing the BLC system under an Air Force contract. Previously, BLC has been tested experimentally on several light aircraft.

(*Turn to page* 94, *please*)

SPEED SENSITIVE SWITCHES

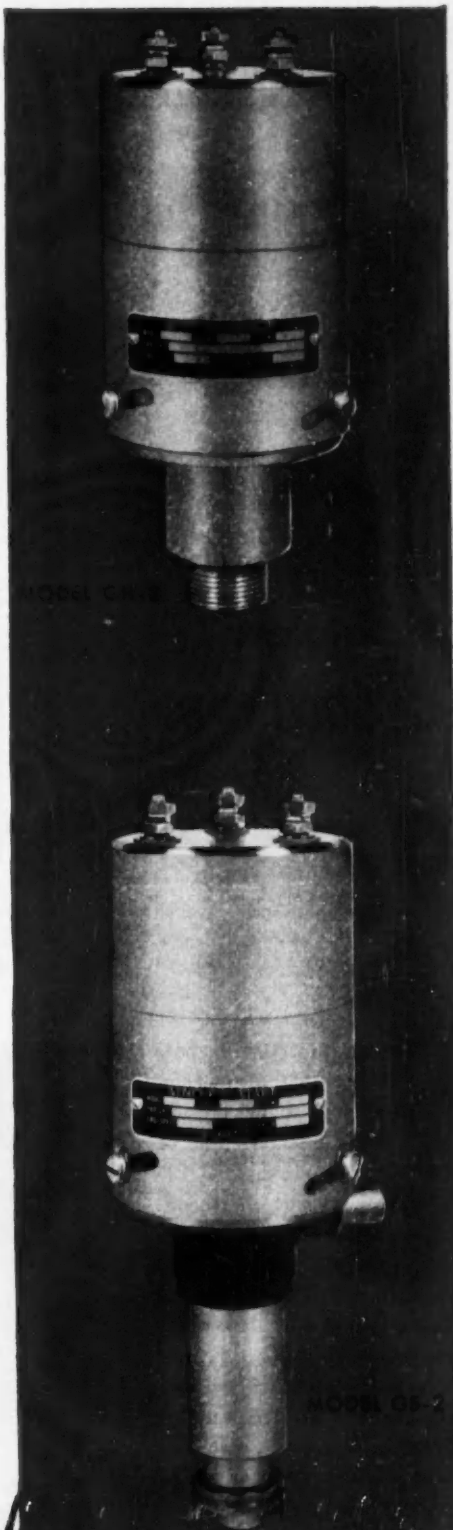
Synchro-Start has re-designed its line of SPEED SENSITIVE CONTROLS in one, two and three switch units so that they will give still longer life, better accuracy and be more economical to build.

These speed sensitive switches are available in two body designs. The GS Series is adaptable to standard distributor take-off to accommodate gear or coupling drives and the rotating parts run in oilless bronze bushings. The GH body design is for standard SAE tachometer drive and runs in oil sealed ball bearings, lubricated for life.

These units contain two snap action switches rated at 10 Amps.-110 Volts A.C. and can be used for either opening or closing circuits at any RPM over 350. Each switch is individually adjustable up to 2000 RPM above specified set speed.

The models shown here are designed for a two speed operation such as cutting out a starting motor and providing overspeed protection with manual or automatic re-set. The dust cap furnished is available with open terminals or a variety of standard or special connector fittings.

Write us for the correct model for your installation

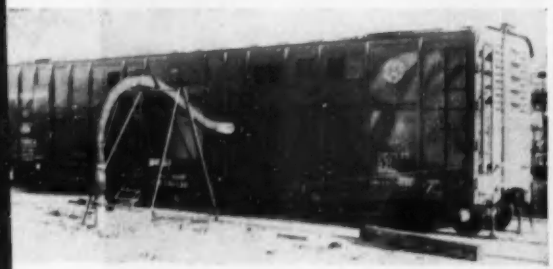


Synchro-Start Products Inc.

Mfrs. of Automatic Engine Controls

8151 N. RIDGEWAY AVE.
SKOKIE, ILLINOIS

Portable Air Compressors

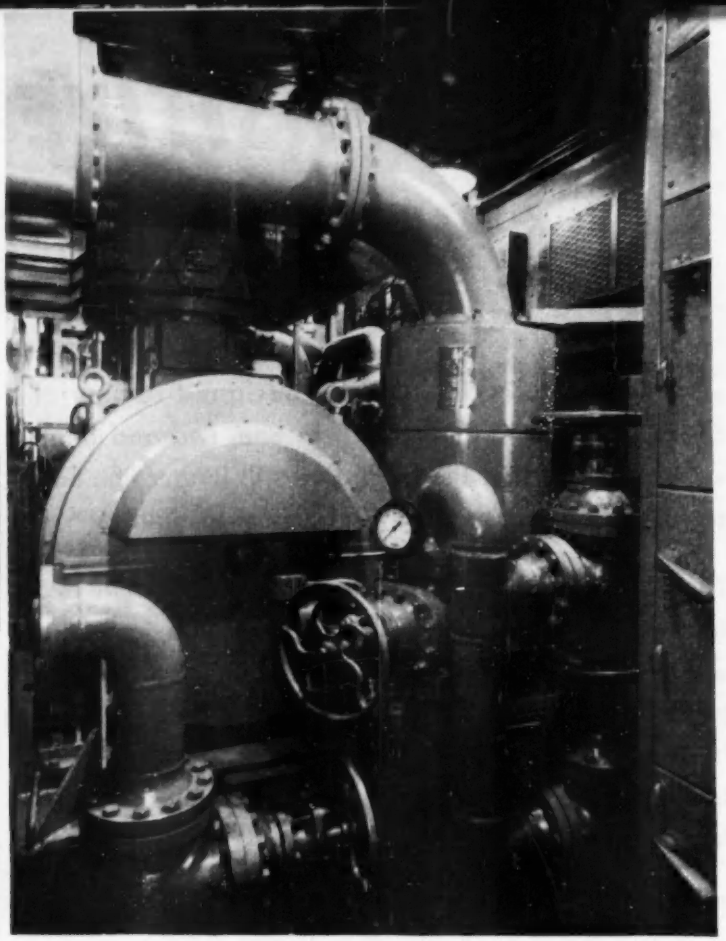


Supply

5000 CPM

at

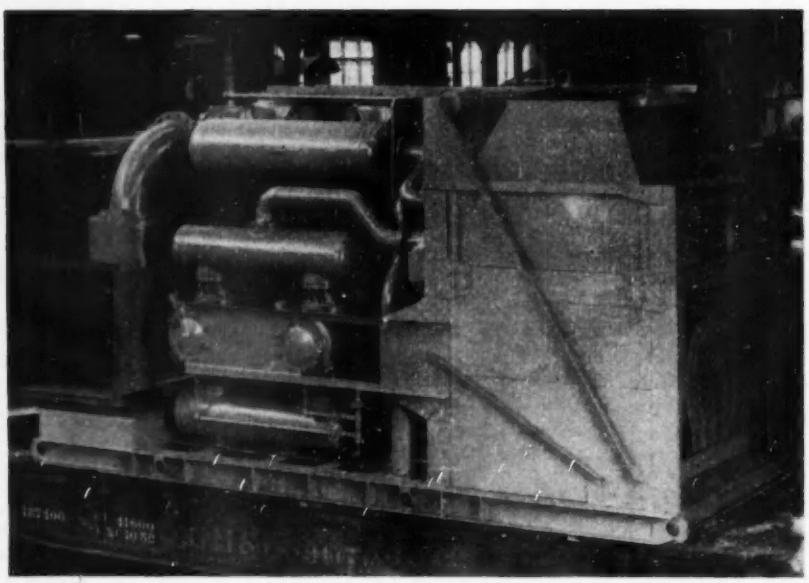
125 PSI



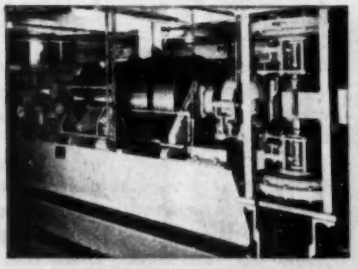
***Left:** The mobile unit was put into use at the Charleston Naval Shipyard when two stationary compressors broke down.*

***Above:** This view inside the car shows one of the two four-cylinder, two-stage Clark air compressors, each driven by a 500-hp synchronous motor.*

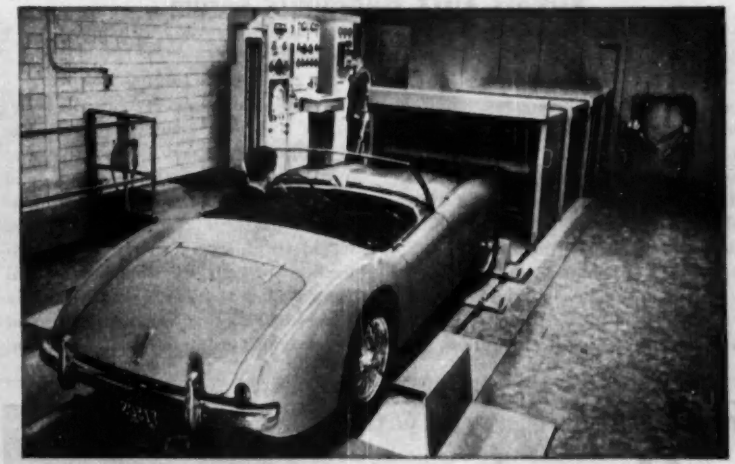
For the first time, a pair of heavy-duty air compressors capable of supplying a combined volume of 5000 cfm at a pressure of 125 psi have been put on wheels. To meet specifications of the Navy's Bureau of Yards and Docks, Clark Bros. Co. has constructed this mobile plant complete with 500-hp electric motors, switchboard, transformers and cooling and lubricating systems, and has fitted this 138,000 lb of equipment into a single 60-ft railway box car. It was designed for the Navy as an emergency unit capable of supplying compressed air for defense projects, construction work, etc.



Each compressor, with motor, lubricating and cooling system, is a self-sufficient unit mounted on steel skids. The entire unit can be removed from the car if necessary for major maintenance.



The INERTIA FLYWHEELS, a useful feature of the Petroleum Laboratory's chassis dynamometer, simulate the "load" on the car or truck being tested. The two large wheels on the right represent 2,000 pounds each, the next one is 1,000 pounds, and a 500-pound wheel is shown on the left. Operated separately or in varying combinations through the transmission, the flywheels can be used to simulate any vehicle weight from 500 to 5,500 pounds in multiples of 500.



DEVELOPING FUELS AND LUBRICANTS FOR TOMORROW'S CARS calls for extensive road testing. To accelerate this work, the Du Pont Petroleum Laboratory has brought the highway indoors with this complete chassis dynamometer setup.

New superhighway *(laboratory style)* for product application research...

The Du Pont Petroleum Laboratory's new chassis dynamometer installation simulates on-the-road driving conditions.

Superhighways of tomorrow will present hundred-mile stretches for steady high-speed car and truck operation. And bigger cities with bigger traffic tangles will increase the wear and tear of stop-and-go driving on cars. Both of these extremes will make heavier demands on fuel and lubricant performance than do present-day driving conditions.

To help refiners and automotive engineers prepare to meet these demands successfully, the Du Pont Petroleum Laboratory is continuing its extensive research program on additives to improve fuel and lubricant performance.

The chassis dynamometer shown on this page plays an important part in this program. Housed in one of the buildings of the Du Pont Petroleum Laboratory at Deepwater, New Jersey, it functions in a way to *bring the highway indoors.*

With it, engineers can simulate most driving conditions . . . from hill climbing to coasting, from open throttle desert racing to threading slowly through traffic on hot city streets.

Along with other accessories, an adjustable air duct produces typical radiator operating conditions at speeds up to 90 mph. And a set of inertia flywheels simulates various car weights under acceleration conditions.

Engineers operate the dynamometer from a control panel where they record data on the performance of the vehicle as affected by fuels and lubricants, as well as other factors. As information is collected and evaluated, it will be made available to the petroleum and automotive industries.

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Vickers First Hydraulics Forum

(*Continued from page 55*)

organize good PM procedures, leading to a reduction in unscheduled difficulties.

4. One of the items of interest was that the Ford organization is now applying hydraulics to automation devices, replacing the pneumatic actuating devices used heretofore.

5. Perhaps the most productive conclusion was that JIC standards represent the best safeguard against the many detail problems of leakage, surges, excessive temperatures in the hydraulic system, etc., etc. Adherence to JIC standards by suppliers and machine tool builders was emphasized. One large motor car producer is said to be inaugurating a new inspection system in which a special group will devote its time exclusively to the inspection of each machine tool before it is accepted for installation.

Although the meeting was purely experimental, its success was guaranteed by following the pattern of the three previous annual Transport Aircraft Hydraulic Conferences sponsored by Vickers. The type of meeting developed by Vickers deserves the attention of other organizations. Based entirely upon audience participation, it starts with an extensive agenda prepared from problems presented by the users. Discussion at the current meeting was led alternately by two moderators — Gordon Swardenski, Caterpillar Tractor Co., representing the users; and J. H. Mansfield, Greenlee Bros. & Co., representing machine tool builders. Vickers played the role of a participant, chiefly through the availability of its entire staff of engineers and field representatives.

One of the features of the meeting was the opening address of H. L. Tigges, exec.-vice-pres., Baker Bros., Inc., and president of the National Machine Tool Builders' Association. He presented a reassuring picture of our current economy, stressing the fact that we are now entering a period of relative normalcy and freedom from Governmental controls, a period more conducive to the American way of free competition. Tigges pointed to the advancements in machine tool design, emphasized that our economy is based entirely upon production economies that make it possible to price products of all kinds within reach of the mass of the people.

Of interest to everyone, particularly the manufacturers, was his report that the House Ways and Means Committee finally has recommended a radical change in depreciation regulations. If these recommendations are adopted by the Congress it will make it easier to amortize production equipment within realistic time periods.

It is noteworthy that automotive manufacturers and others considered this conference important enough to assign their top representatives from maintenance departments, plant engineering, and in some instances from the master mechanic's department. Regardless of their titles these men are vitally concerned with the operation of production equipment and thoroughly familiar with detail problems.

In discussing maintenance problems, assurance was given that the life of major hydraulic components such as pumps and motors was at least equal to the life of the machine tool itself. It was developed that the key to trouble-free performance will


They're pouring futures in the foundry !
When man first cast molten metal, he poured himself a future. He started something that has become more and more important – a process our great industries could not do without. The results are everywhere. You'll find castings used again and again in a multitude of applications. They're on the *horizon,* too . . . clearly marked for the products of tomorrow.
Helping push this progress in the foundry is Campbell, Wyant and Cannon. From the cupolas, electric furnaces, and converters of CWC flow metals with a background based on new ideas, new processes, new methods in casting techniques. Not content with producing the best of today's castings, the engineers of CWC are already planning the things to come. Remember, for all that's new in castings, keep your eye on Campbell, Wyant and Cannon.
CAMPBELL, WYANT AND CANNON
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Muskegon, Michigan
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Since 1908

be found in the establishment of a good PM system, coupled with proper protection of the hydraulic system with suitable filters and temperature control.

Noteworthy feature of the conference was the self-criticism of hydraulic devices encouraged by Vickers. As a representative of one of the leading automotive producers expressed it, this implied an implicit confidence in the quality of engineering and manufacture inherent in Vickers products.

As an example of this one of the topics for discussion was whether mechanical feeds may be desired in some cases in preference to hydraulic feeds. It developed that some users have been installing mechanical feeds on a fw specialized applications, particularly where leakage had been experienced on heavy duty machines. Discussion brought out the fact that some users have both types in operation; that mechanical drives and feeds cost more than hydraulics; and that better control of production rates and greater flexibility of operation are provided by hydraulics.

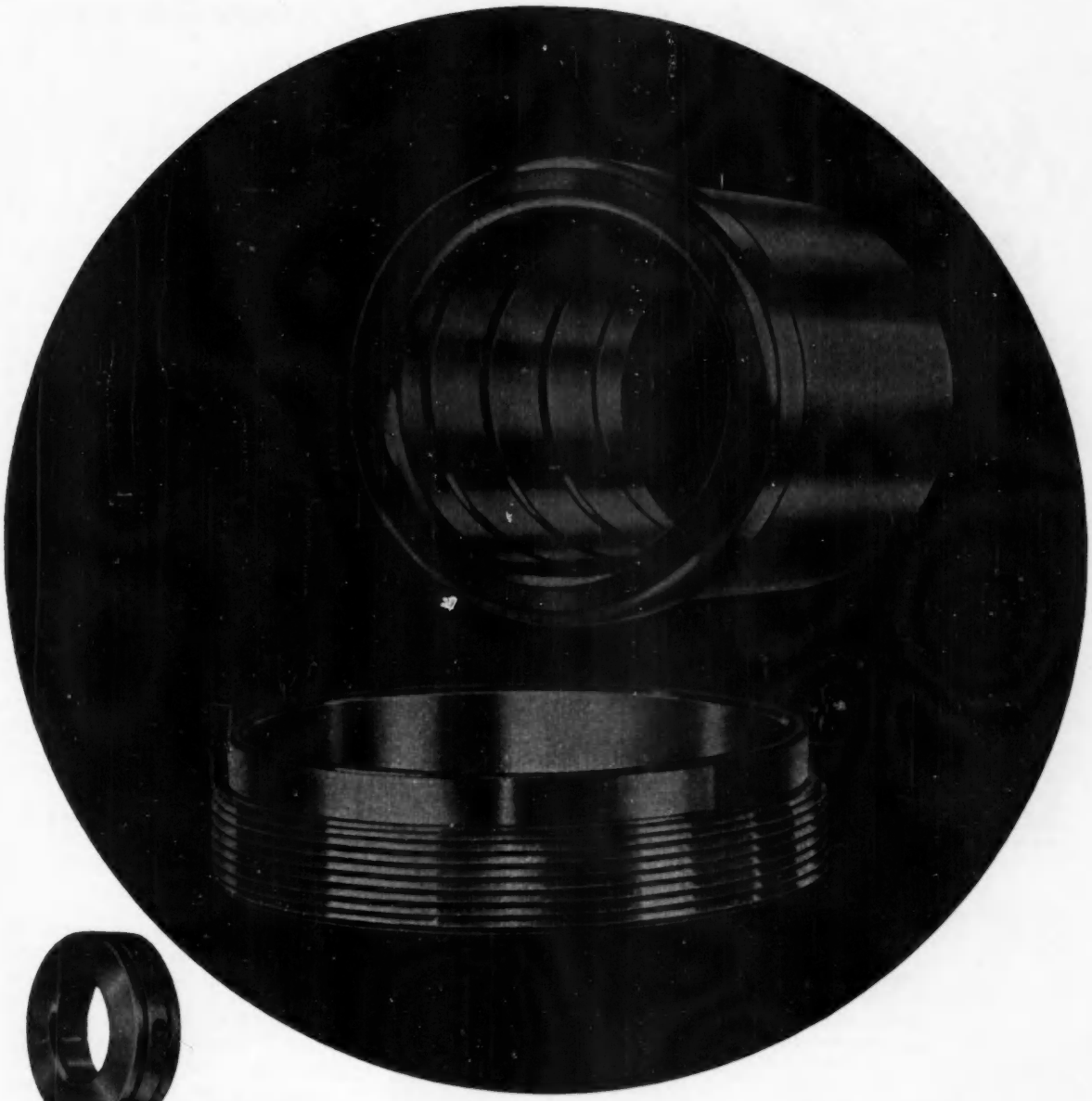
One of the major problems today is the dearth of skilled workers with a background in hydraulics since this is a relatively new art in the manufacturing field. It was pointed out that Vickers operates a school which is available to selected people. Illinois Institute of Technology has courses of instruction in this specialty. Latest development is that the U of M is now in the process of building an impressive fluids laboratory to be used in conjunction with a major revision of its science curriculum. In the future U of M will be in position to turn out men capable of working on all hydraulics problems of industry.

It was not surprising to find a lot of discussion on the subject of the so-called safety or fire-resistant hydraulic fluids. This matter had been aired in considerable detail at the Industrial Hydraulics Conference held in Chicago last fall under the auspices of the Illinois Institute of Technology. At the present time there are three major types of safety hydraulics fluids on the market — all of synthetic type and naturally much higher priced than mineral oils. Certain specific types are being marketed by a number of large companies — including E. F. Houghton, Monsanto, Carbide & Carbon, and others.

According to some of the experts, because of much higher costs the safety fluids currently are being applied only in places where a source of ignition exists and where fire hazard is ever present. While we cannot list all known applications, certainly among the most important are — on die casting machines, welding machines, and in one instance on scrap balers.

The important thing to bear in mind when considering the use of a safety fluid is compatibility of the fluid with the gamut of packings, seals, and pipe fitting dopes employed throughout the system. Sometimes it is necessary to make major changes if loss of expensive material is to be avoided. Moreover, each type of fluid requires different user instructions. Consequently, they cannot be used interchangeably in a given machine without a study of the situation. It means in effect that once a satisfactory safety fluid has been adopted, it is best to stay with it.

Leakage and protection against contamination are vital considerations. On the other hand, where fire hazard exists, it is a comfort to learn that despite the high cost and the special precautions, use of safety fluids does reduce fire hazard, reduces the apprehension on the part of the operators, and results in lower insurance cost.



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Complex Grille Unitized

(*Continued from page* 33)

operators first fit the horizontal and vertical fins loosely in place in the fixture. Then the vertical fins are pressed securely into place. It is of interest that this has to be done by hand, hammering into place and relying upon the skill of the operator to suitably modulate the blow. Studies made originally to determine whether pressing-in might be done by machine methods proved the hand method now in use to be most effective.

Final step on this line is the installation of the grille retainer, a frame that facilitates attachment to the bumper.

The grille is then removed from the plastic fixture and transferred to an overhead conveyor line, where it is fitted with a variety of accessories and made ready for final assembly. As the overhead conveyor moves forward it crosses over the front bumper line, thus permitting transfer of grilles at this point. Front bumpers are assembled from the four major sections, mentioned earlier, in fixtures riding on a wide table belt conveyor. As the grille conveyor crosses this line, the grille is removed, fitted into the bumper fixture, and securely attached.

This sub-assembly now is ready for transport to the Cadillac final car assembly line, where it is installed as a single unit.

Another item of interest is the special line set up for the installation of aluminum moldings on ElDorado bodies. Because of the character of this fine custom car, the application of the wide lower molding at the rear fender is a painstaking job requiring meticulous fitting.

As illustrated, the body is loaded onto the special fixture by means of a winch and held securely during the operation. The holes for fastening the molding are spotted by means of the elaborate drill jig shown here, and spot-drilled. Then the fixture is removed and the holes are enlarged, using the drilled holes as a guide for centering. The matching strip on the fender skirt is fitted at the same time to secure perfect alignment of both sections. The bodies then are ready for transport to the final assembly line.

It is noteworthy that in this instance as well as in the case of the front bumper and grille assembly every effort has been made to complete time-consuming operations away from the final assembly line.

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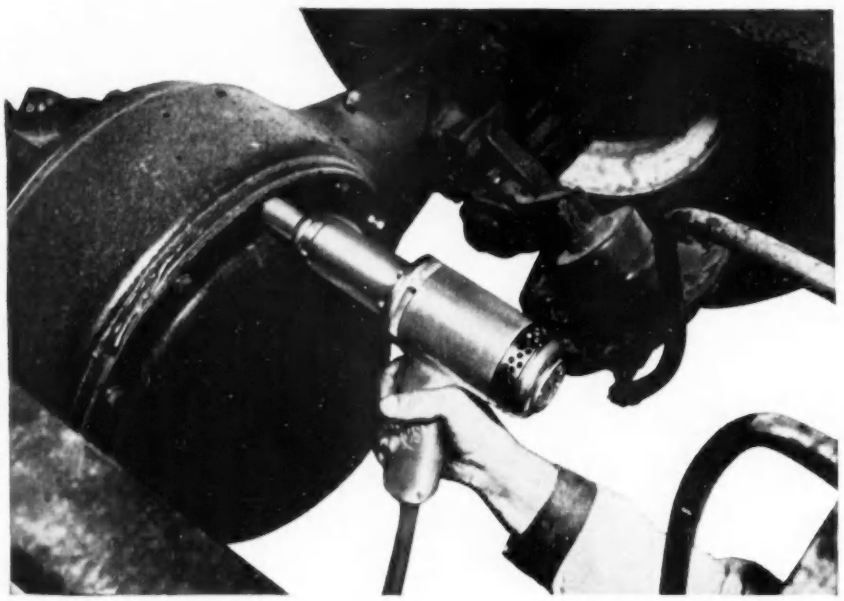

Here's a Universal Electric Impact Wrench that can really get itself into tight spots! And its powerful impact action, developing 2,000 blows per minute, runs nuts and screws or drills and taps easier, faster and with far less effort! It's the speedy ⅜″ bolt size capacity CP-903R with its bonus capacity rating of ⅝″.

Purposely designed with a slim profile for those awkward spot jobs, the wrench's nose section measures only 2″ in diameter. Handy snap switch on the handle prevents reversing while wrench is running . . . affords simple one-hand operation. Pistol grip handle is centered at exact point of balance for effortless handling. And the CP motor is "unitized" for vibration resistance . . . affords long, maintenance-free service life. Write *Chicago Pneumatic Tool Company, 8 E. 44th St., N. Y. 17, N. Y.*

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Drum Temperatures

(*Continued from page* 37)

Several locations of the pyrometer relative to the brake shoe were tried and the most successful was found to be in the center and at the trailing end of the forward brake shoe. This position is shown in Fig. 8. The backing plate shown in this picture was cut away during attempts to operate the pyrometer at various positions.

After running the tests described above, questions arose as to the rate of cooling of the brake drum surface. In other words, was the distance from the end of the forward brake shoe to the pyrometer critical? The spacing used for all the curves reported above was about one inch from the trailing end of the forward shoe.

To determine the cooling rate of the surface a series of stops under the constant test conditions were made, and the distance from the forward brake shoe to the pyrometer was varied through the range of ⅛ to 1¼ in. The peak surface temperatures for the various distances are plotted in Fig. 9. It can be seen that the surface temperatures reported in this paper would have been somewhat higher if we had located our radiation pyrometer close to the trailing end of the brake shoe instead of the one inch distance used.

All of the stops described in the above paragraph were made from 35 mph. The calculated time for a particular spot on the brake drum surface to pass from the end of the brake shoe to the pyrometer tip at 35 mph is also shown in Fig. 9. We see that with the pyrometer tip ¼ in. from the end of the brake shoe, about 0.001 sec is required for a given drum area to cross this gap. At 70 mph the time intervals would be one-half that shown for the respective locations.

Mr. Lathan Baker, General Motors Research engineer, worked with the authors during the final phases of this project. Most of the curves shown above were from tests run by Mr. Baker.

The thermopile used in the pyrometer tip was built by Mr. Charles M. Reeder.

AIRBRIEFS

(*Continued from page* 82)

Ford Tri-Motor—Again

William B. Stout, designer of the immortal Ford Tri-Motor of the late 'twenties and early 'thirties (although about 30 are still flying) plans to place the transport into production again—believe it or not. Stout is convinced there exists a firm market for more than 100 of the rugged planes for "bush" operations. He is completing plans for production in Southern California and plans to power the new machine, which will have a slightly wider fuselage, with three P&W R-985 Wasp Junior engines. He estimates the new machines will sell for about $100,000 each (something like five times their 1927 price—at least in 1927 dollars).

Navy Tests Battery

The Navy has moved its examination of the Yardney Silvercel silver-zinc battery into the flight test stage. The battery is now being tested in the nose of a Grumman F9F-6 Cougar jet fighter, although it is known to have been widely used in classified missiles for more than two years. The Yardney battery has alternate silver and zinc plates and uses an electrolyte of potassium hydroxide. Battery current is generated by ion exchange between the plates, instead of the actual chemical exchange in conventional batteries. This gives the Silvercel its exceptionally long life and high discharge rates.

Storm Detection

U. S. airlines are giving close study to the new Bendix RDR-1 storm detection radar for civil transport planes. Lighter and more effective than the present AN/APS-42 unit used in military transports, the new unit will permit the flight crew to detect and fly around thunderstorms, providing not only vastly increased passenger comfort but safety for the aircraft structure as well. The system uses a conventional radar dish antenna in the nose and the display may be sent to as many indicators (pilot, co-pilot, flight engineer, etc.) as may be desirable. First airline installation will be in the Douglas DC-7's for Pan American Grace Airways but Bendix reports orders from executive aircraft owners as well.

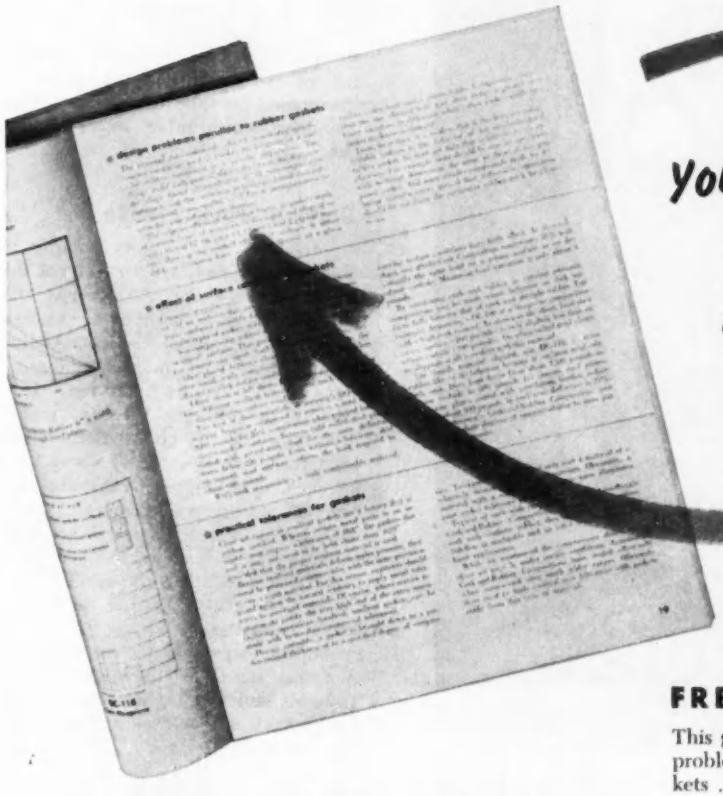
Two Up—One to Go

Successful first flight of the Convair YC-131 turboprop-powered military transport joins tests on the huge Douglas YC-124B as the first two military turboprop transports in the U. S. Nearing completion is the third test plane, a Boeing C-97 with turboprop power. First U. S. turboprop transport was the Convair Turboliner developed for Allison in December, 1951. The Convair YC-131 is powered by two Allison T56 units of 3750 hp each while the Douglas and Boeing machines mount four P&W T34 units of 5500 hp each. The three military planes will undergo extensive service test by the Air Research and Development Command to determine the advantages and limitations of such power for long-distance, heavy-load military operations.

Towards Luxury

The principal reason for initial selection by the Air Force of the Muroc, Calif., desert site of its Flight Test Center was the existence of a seven-mile long runway of hard-packed dry salt lake bed, which obviated the need

Why do rubber gaskets present special problems to designers?



You'll find the answer in this newly revised gasket manual

17 helpful sections, including:

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- **Relation of gasket thickness to load**
- **Design problems peculiar to rubber gaskets**
- **Effect of surface conditions on gaskets**

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This gasket manual helps you solve special design problems posed by non-compressible rubber gaskets . . . has practical data on tolerances for various gasket materials . . . gives data on materials that meet current SAE-ASTM and U. S. Government specifications. "Armstrong's Gasket Materials" is a helpful 24-page manual for those who design and use gaskets. Gives information on gasket materials, gives suggestions on gasket, flange, and joint design, plus what to look for when choosing a material. In Sweet's product design file, section 3h, or send coupon below for a personal copy.

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ARMSTRONG'S GASKET MATERIALS

for expensive runway construction. Now comes the news that the Air Force is constructing the world's longest runway, a 15,000-ft concrete strip, at Edwards Air Force Base, as it has been known since World War II. The runway is 19-in. thick and can support the operation of planes weighing as high as 500,000 lb (about one-quarter more than the heaviest flying today—Convair B-36J). Reason for the costly addition: the rainy season places the lake bed under a foot of water which takes weeks to dry out.

British Dark Horse

Now that the "Comets Coming to U. S." furore has died out—if not the Comet itself—a new British gas turbine transport is threatening to crash the U. S. market. Capital Airline officials have been in serious discussions with Vickers-Armstrong concerning the Vickers Viscount transport powered by four Rolls-Royce Dart turboprop engines of about 1500 hp each. The British transport carries 62 passengers in an air coach version yet is claimed to sell for only about $750,000 (compared to exactly twice that for a DC-6/7 or Lockheed Super Constellation in the same passenger-capacity category). A CAA evaluation team is now in England studying U. S. certification of the Viscount and Capital president J. H. Carmichael is reportedly "sold" on the transport.

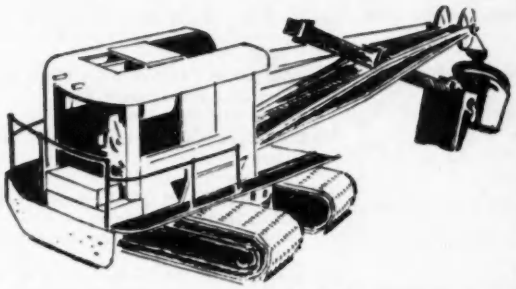
Airframe Jigs

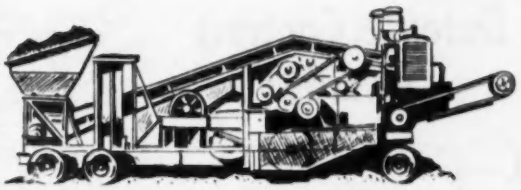
(*Continued from page* 54)

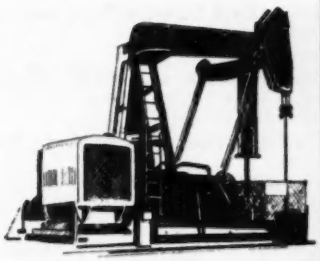
this purpose, tying up valuable space.

Engineering changes are quickly incorporated into the new jigs. The portion affected is removed, and taken to the surface table in the jig shop where the change is made.

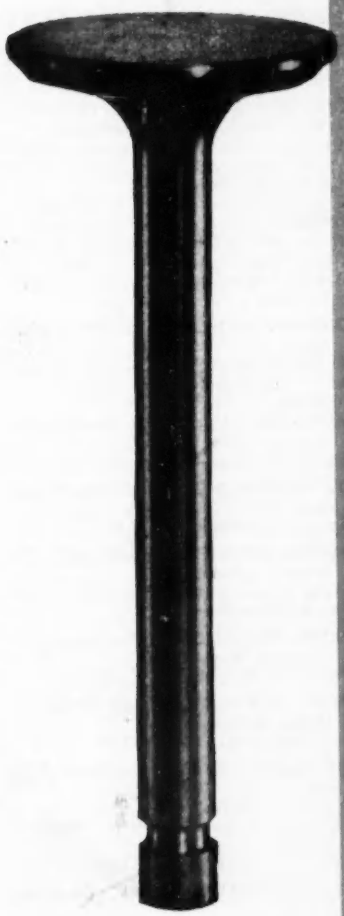
Since the innovations of the new method of jig design and jig building, tooling estimates have run approximately 27 per cent lower where the cast beams can be used.







WAUKESHA



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THOMPSON VALVES

Waukesha engines power trucks, highway tractors, farm equipment, stationary installations and off-the-road equipment... anywhere that low-cost ever-dependable power is needed.

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VALVE DIVISION

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More Defense Contract Awards

THIS latest list of defense prime contracts that have been awarded covers the period from April 15 to May 19, 1954. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, airplanes, automotive components and spare parts, automotive maintenance equipment, etc.

ACF-BRILL MOTORS CO., Hall-Scott Motors Div., Phila., Pa.
Repair parts for gasoline engines—250—$139,499

AEROJET GENERAL CORP., Azusa, Calif.
Motor, jato—20—$36,665

ALLIS-CHALMERS MFG. CO., Tractor Div., Milwaukee, Wisconsin
Tractor, crawler—1 ea—$18,220
Spare parts—1 lot

AMERICAN BOSCH CORP., Springfield, Mass.
Spare parts—$153,874

AVCO MANUFACTURING CORP., Lycoming Div., Stratford, Conn.
Engines—167—$5,459,720
Special tools and spare parts for engines—$81,179

AVCO MANUFACTURING CORP., Lycoming Div., Williamsport, Pa.
Engine assembly—346—$533,277

BAKER-LULL CORP., Minneapolis, Minnesota
Spare parts—Job—$45,901

BENDIX AVIATION CORP., Bendix Products Div., South Bend, Indiana
Engine parts for P&W engines—Various—$803,519
Maintenance parts—Various—$743,872
Carburetors—300—$295,908
Brake assy—365—$68,942
Wheel assy—172 ea—$627,165

BORG-WARNER CORPORATION, Bedford, Ohio
Pumps—Various—$183,110

CASSNA AIRCRAFT CO., Wichita, Kansas
Airplanes (Navy) and spare parts—25 ea—$1,200,000

CATERPILLAR TRACTOR CO., Peoria, Illinois
Spare parts—Lot—$273,888
Tractors—8 ea—$251,730
Brush rakes—6 ea

CHAMPION SPARK PLUG CO., Toledo, Ohio
Igniter—6500 ea—$60,853

THE CLEVELAND PNEUMATIC TOOL CO., Cleveland, Ohio
Actuator—150 ea—$252,758
Maintenance parts—Various—$114,366

COAST APPARATUS, INC, Concord, Calif.
Truck, fire, class 530, 2½ ton, 6x6, fire-fighting—28—$205,044

CONTINENTAL AVIATION & ENGINEERING CORP., Detroit, Michigan
Design, development and manufacture of five Model AOI-1195-5 engines—Job—$553,802
Engine development—Job—$118,264
Integral auxiliary engine for mounting on Model AVI-1790-8 engine—Job—$91,096
Design and manufacture of a Model AH-760 engine, phase I and II—Job—$749,683

CONTINENTAL MOTORS CORP., Detroit, Mich.
Engine, Model AVI-1790-8—3 ea—$31,725
Major component design agency—Job—$75,514
AVSI-1790-6 engines, and spare parts—Job—$178,484
Engine assembly—60 ea—$113,278

CONTINENTAL MOTORS CORP., Muskegon, Mich.
Spare parts—Various—$27,118

CUMMINS ENGINE COMPANY, INC., Columbus, Indiana
Diesel generator 100 KW—80—$1,159,132
Spare parts—$46,481

CURTISS-WRIGHT CORP., Electronics Div., Carlstadt, New Jersey
Trainer, flight simulator—4—$2,780,178

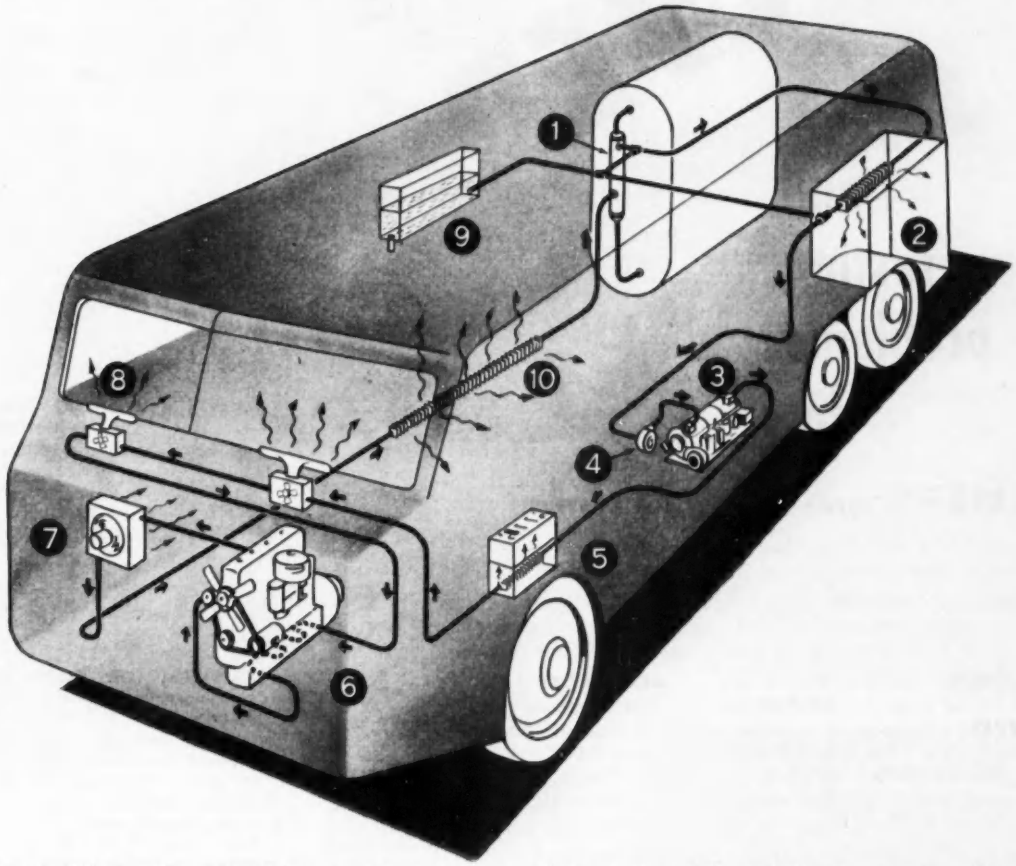
ELASTIC STOP NUT CORP. OF AMERICA, Union, New Jersey
Nut—14,567,000 ea—$211,248

FARGO MOTOR CORP., Washington, D. C.
Power wagons—30 ea—$66,156
Trucks—29—$29,074
Police cars (Plymouth Sedans)—40 ea—$65,308
Light trucks—7 ea—$15,960

FLETCHER AVIATION CORP., Pasadena, Calif.
Spare parts for fuel tanks—$121,415

(*Turn to page* 100, *please*)

HOW TO KEEP VEHICLES "hot on the trail"



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2. *Heat exchangers in special compartments.*
3. *Heart of the system — Janitrol Liquid Heater.*
4. *Liquid circulating pump.*
5. *Heat exchanger in battery compartment.*
6. *Circulation of heated liquid through crankcase and water jackets of engine. (Preheating, standby and maintenance of temperature throughout heating system.)*
7. *Liquid-to-air heat transfer for personnel comfort — cab heating.*
8. *Liquid-to-air heat exchanger coils for defrosting.*
9. *Surge tank. Vent lines from high points in system connect to surge tank.*
10. *Exchanger for cargo, passenger or miscellaneous heating requirements.*

First — and most important — toss your problem into a competent lap! And that means call in Janitrol. Janitrol's experience in applying *liquid* heaters to vehicle heating problems is the culmination of thousands of successful installations on military and commercial vehicles *in operation* all over the world.

The composite drawing illustrates typical elements of Janitrol vehicle heating systems. Any or all of these needs are met by dependable Janitrol Liquid Heaters—regardless of the weather outside.

But remember the first point, and get in touch with Janitrol preferably during vehicle design stage. And for best results on existing vehicles, Janitrol does the job easier with runs of tubing, and compact heat exchangers.

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(*Continued from page* 98)

FLIGHT REFUELING, INC., Baltimore, Maryland
Facilities, production of automatic hose reel assys—$586,700

FOOD MACHINERY AND CHEMICAL CORP., Riverside, Calif.
Rehabilitation of 75 landing vehicles—$514,567

FOOD MACHINERY & CHEMICAL CORP., San Jose, Calif.
Vehicles, spare parts—16,004—$14,421,806

FORD MOTOR CO., Ford Div., Washington, D. C.
Trucks, cab and chassis—12 ea—$25,470
Passenger carrying vehicles—269—$339,848

GENERAL FIRE TRUCK CO., Div. General Detroit Corp., Detroit, Mich.
Semi-cab fire trucks—33 ea—$301,849

GENERAL ELECTRIC CO., Schenectady, New York
Test bench harnesses—150—$978,399

GENERAL ELECTRIC COMPANY, Cincinnati, Ohio
Special tools and ground handling equipment—$100,000

GENERAL ELECTRIC CO., Evendale, Ohio
Conversion of test cells—$800,000

GENERAL MOTORS CORP., Detroit, Mich.
Distributor ignition—538 ea—$159,618
Generator—88 ea
Motor assy—4382 ea

GENERAL MOTORS CORP., Dayton, Ohio
Kit assy—2,464 ea—$654,884
Lever governor—264 ea
Piston and cylinder assy—264 ea

GENERAL MOTORS CORP., AC Spark Plug Div., Flint, Mich.
Spark plugs—519,968—$813,872

GENERAL MOTORS CORP., Allison Div., Indianapolis, Indiana
Spare parts for J72 engines—$2,000,000

GENERAL MOTORS CORP., Chevrolet Motor Div., Detroit, Mich.
Passenger carrying vehicles—46—$72,031

GENERAL MOTORS CORP., Fisher Body Div., Detroit, Mich.
Gun mount—14—$55,356

GENERAL MOTORS CORP., Foreign Dis., New York, N. Y.
Panel trucks—9 ea—$15,804

GENERAL MOTORS CORP., GMC Truck & Coach Div., Pontiac, Mich.
Spare parts—1410—$675,628
Truck tractor—3 ea—$22,131

GENERAL MOTORS CORP., Oldsmobile Div., Lansing, Mich.
Spare tubes—79—$46,215

GENERAL MOTORS CORP., Pontiac Motor Div., Detroit, Mich.
Passenger carrying vehicles—11 ea—$22,389

GENERAL MOTORS CORP., United Motors Service, Detroit, Mich.
Automotive spare parts—46,100—$33,030

THE GOODYEAR TIRE AND RUBBER CO., Akron, Ohio
Belt, fan—200,000—$143,153
Wheel assys, brake assys—320—$92,042
Motor vehicle parts—33,650 pr—$83,452
Wheel assy—385 ea—$82,593
Maintenance parts—Various—$106,023

GREER HYDRAULICS, INC., Brooklyn, New York
Stand test—180—$1,224,288

GRUMMAN AIRCRAFT ENGINEERING CORP., Bethpage, L. I., New York
Maintenance parts—Various—$29,819

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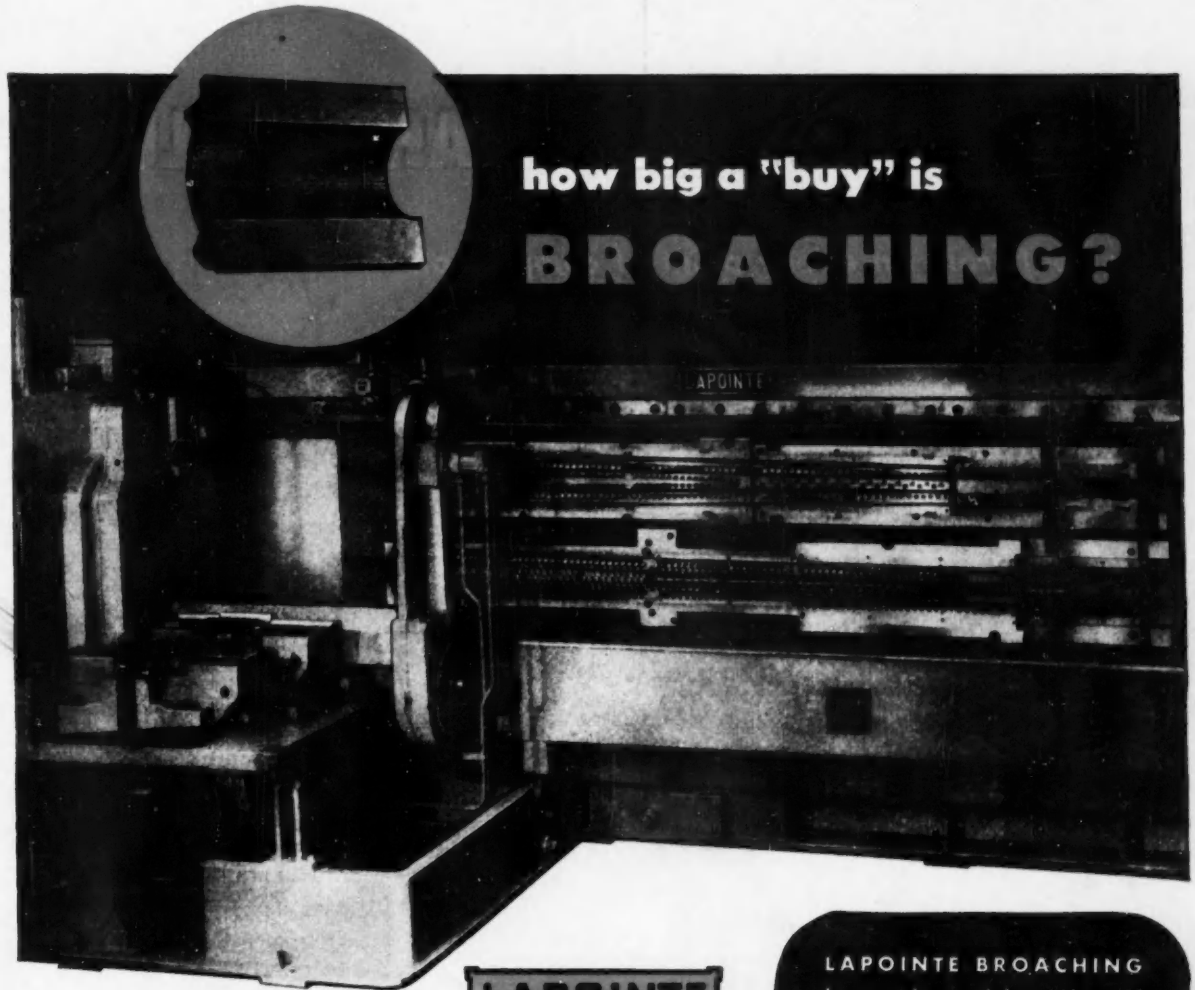

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a neat question . . . and LAPOINTE comes up with a neat answer in this amazingly smooth-operating

50 hp 120-inch stroke single ram horizontal BROACHING MACHINE with ELECTRO-MECHANICAL DRIVE

LAPOINTE BROACHING is truly a big "buy" in these days which require the utmost in production speed, the maximum ability to meet tolerance and finish specifications, and the lowest possible production costs.

Full **CARBIDE-TIPPED TOOLING** and a broaching speed up to **160 feet per minute** result in a production of 125 clusters per hour (625 individual bearing caps) completely broached in the same stroke as follows:

1st station: broach back face and boss. 2nd station: finish broach joint faces, edges, and adjacent chamfers.

Send for new bulletins on Lapointe electro-mechanical drive broaching machines:

Single ram horizontal, **SRHE-10**

Double ram vertical, **DRVE-10**

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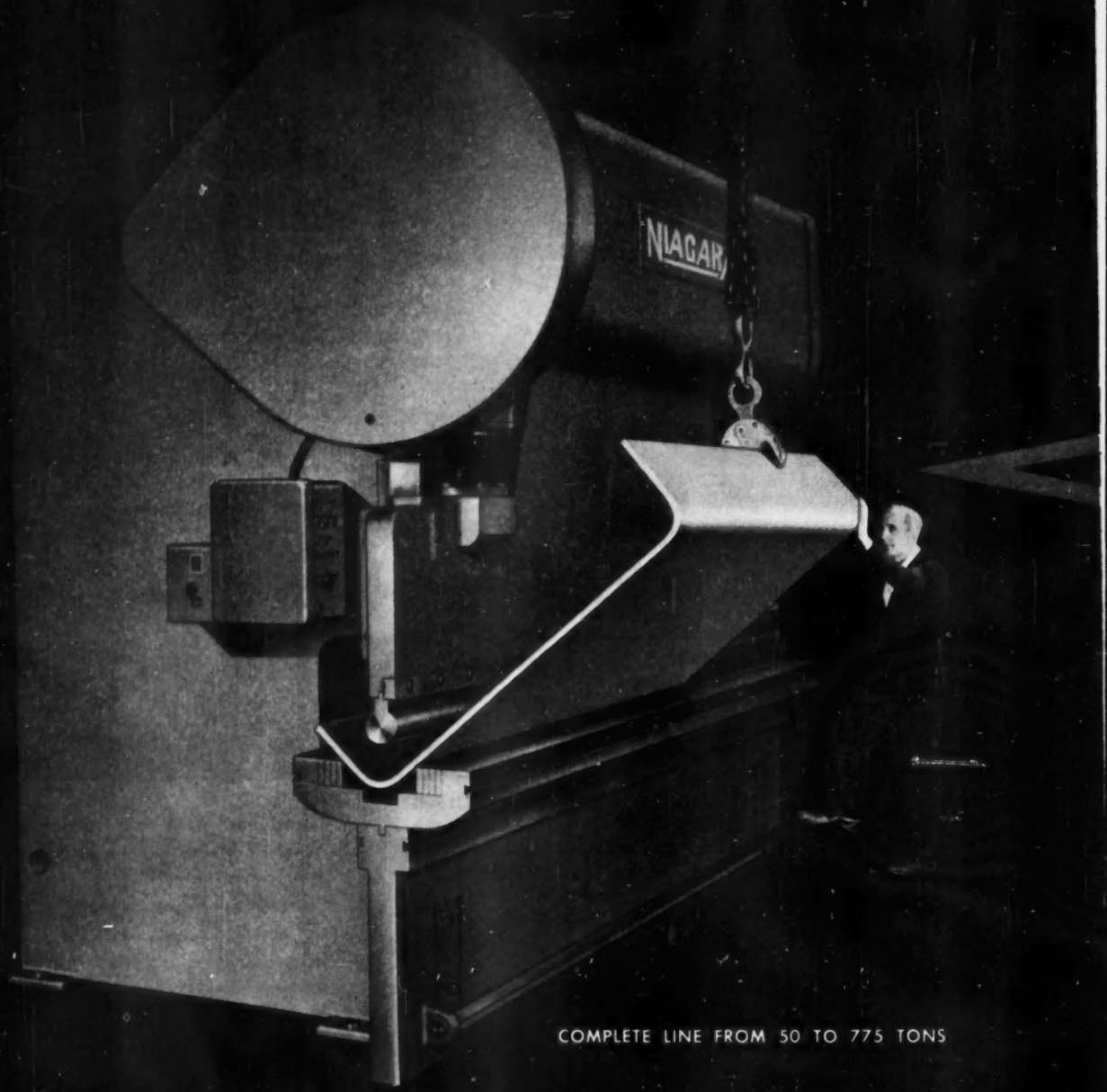
THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

IT'S THE NEW, "YEARS-AHEAD" LINE...

Far out front on every point of comparison



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NIAGARA MACHINE & TOOL WORKS 1879 75 1954

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ALL STEEL PRESS BRAKES

"MULTI-MACHINE" VERSATILITY TO BOOST PRODUCTION

Practically limitless in their scope of forming, bending, punching, blanking and related operations, Niagara Press Brakes get more done for you because they do more jobs. One reason: Advanced design. Another: The extensive line of Niagara Press Brake Dies available.

UNIFORM BENDS WITH STRAIGHT-EDGE ACCURACY

Double end twin drives with double reduction gearing, *on all models,* provide uniform, constant application of power at both ends of the ram. Off-center loading presents no problem.

Rugged, streamlined frames feature box type crowns of unequaled strength and rigidity, assuring maximum resistance to deflection and permanent alignment of bearings and ram.

3-SHIFT STAMINA TO HANDLE WORK-HEAVY SCHEDULES

Close attention has been given to every design detail. Nothing has been overlooked. Each frame size has been scientifically tested to detect and eliminate harmful stresses at all critical points.

Laminated non-metallic ways, an exclusive Niagara feature, reduce wear to an absolute minimum, providing accurate alignment and longest possible service life. All gearing is totally enclosed in sealed oil baths for thorough, clean lubrication.

Once again, Niagara's forward-thinking engineering has produced a metal working machine years ahead of its time. As you become familiar with the significant developments embodied in this revolutionary new line of all steel press brakes, you will realize why it carries the Niagara nameplate. After all, who is more uniquely qualified to be its builder than the builder of America's most famed and most complete line of presses, shears, other machines and tools for plate and sheet metal work?

Call in your nearest Niagara representative at once. Let him tell you, *in detail,* what these great, new press brakes can do for you.

CHECK ALL THE FACTS, YOURSELF!

Compare. Make a careful, feature-by-feature appraisal of Niagara's years-ahead press brake design. Write for new Bulletin 89C . . . the most comprehensive press brake literature ever published.

NIAGARA MACHINE & TOOL WORKS
BUFFALO 11, N. Y.
DISTRICT OFFICES:
Detroit • Cleveland • New York • Philadelphia
Dealers in principal U. S. cities and major foreign countries

engineered to expand your output ...AT SAVINGS!

(*Continued from page* 100)

HENNEY MOTOR CO., INC., Freeport, Ill.
Ambulances—8 ea—$43,783

HUGHES AIRCRAFT CO., Div. Hughes Tool Co., Culver City, Calif.
Facilities for missiles and missile system—$2,462,609

HYSTER COMPANY, Portland, Oregon
Truck tractor—13 ea—$62,041

INTERNATIONAL HARVESTER EXPORT CO., Chicago, Ill.
Tractors—6—$92,399
Spares—4

LA CROSSE TRAILER CORP., La Crosse, Wisconsin
Trucks, cab and chassis—5 ea—$15,315
Truck tractor—9 ea—$26,557

McDONNELL AIRCRAFT CORP., St. Louis, Missouri
Maintenance parts—Various—$304,242
Spare parts—Various—$865,708

THE GLENN L. MARTIN CO., Baltimore, Maryland
Maintenance spares—Various—$76,599

NASH-KELVINATOR CORP., Nash Motors Div., Detroit, Mich.
Police cars (Hudson sedans)—40 ea—$66,117

NORDBERG MANUFACTURING CO., Milwaukee, Wisconsin
Diesel generating unit, 2500 KW—2—$282,737

NORTHROP AVIATION, INC., Hawthorne, Calif.
Facilities—$1,000,000

OLIVER CORP., Export Div., Chicago, Ill.
Tractors—4 ea—$42,592
Spare parts—4 ea

OSHKOSH MOTOR TRUCK, INC., Oshkosh, Wisconsin
Truck, cab and chassis—7 ea—$100,018

OUTBOARD MARINE & MFG. CO., Johnson Motors Div., Waukegan, Ill.
Repair parts for gasoline engines—9565—$151,377

PACIFIC CAR & FOUNDRY CO., Renton, Washington
Rebuilding of 60 ton barge—Job—$185,738

PACKARD MOTOR CAR COMPANY, Detroit, Mich.
12 cylinder, 600 BHP Diesel engine—2—$123,420

PIASECKI HELICOPTER CORP., Morton, Pa.
Transmission, rotor hub assemblies—106—$95,032

RADIOPLANE COMPANY, Van Nuys, Calif.
Aerial targets, data, spare parts—$3,541,778

RAYBESTOS-MANHATTAN, INC., Manhattan Rubber Div., Passaic, N. J.
Hose aircraft flame resistant—207,600 ft—$94,101

ROHM & HAAS COMPANY, Phila., Pa.
Plastic sheet—4568 sh—$105,141

SOLAR AIRCRAFT CO., Des Moines, Iowa
Facilities-production of J 71 engine component—$200,000

STANDARD PRESSED STEEL CO., Jenkintown, Pa.
Nut—6,948,400 ea—$95,300

THOMPSON PRODUCTS, INC., Cleveland, Ohio
Pump assy: fuel—Various—$68,606

VAPOR HEATING CORP., Chicago, Ill.
Spare parts for FJ-2 aircraft—184 ea—$80,003

WAUKESHA MOTOR CO., Waukesha, Wisconsin
Spare parts—Various—$28,336

WESTINGHOUSE ELECTRIC CORP., Dayton, Ohio
Facilities, production of prototypes of G-20 ground control equipment—$150,000
Generators—681—$622,397

WESTINGHOUSE ELECTRIC CORP., Phila., Pa.
Engine spare parts—Various—$21,201,280
Overhaul engines and repair parts—Various—$186,000
Material for use on J46 engines—Various—$1,865,522

WESTMORE HODGES & ASSOCIATES, Redwood City, Calif.
Operation of testing project on ordnance tires, vehicles and components—Job—$517,300

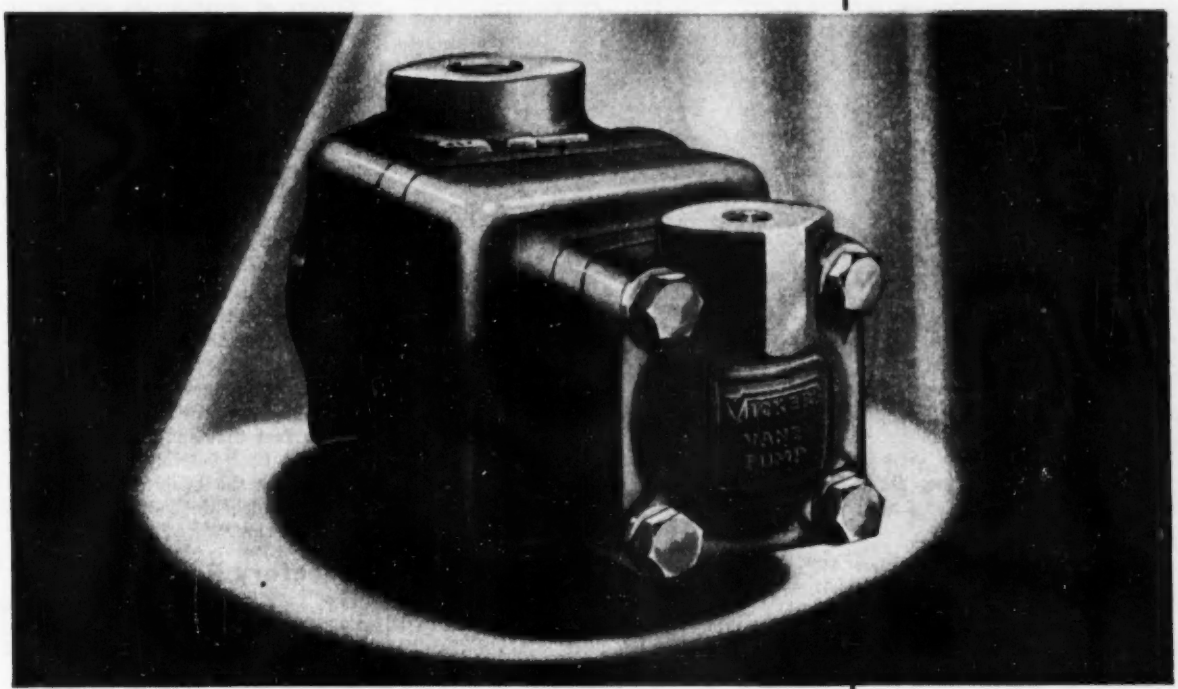
WILLYS MOTORS, INC., Washinaton, D. C.
Trucks spare parts—322 ea—$474,452
Motor vehicles—10 ea—$15,960
Jeep engines and parts—Lot—$51,107

WILLYS MOTORS, INC., Toledo, Ohio
Jeeps—35 ea—$44,437
Trucks—41—$64,531
Light trucks—8 ea—$15,232

ONE OF A SERIES

You Get Many Benefits by Specifying VICKERS® Hydraulics

Long-Established QUALITY



Certain names and designations have become synonymous with long-established quality in consumer products. Some that you will recognize are Sterling, Sheffield, Wedgwood, etc. Similarly, certain names signify long-established quality in industrial products . . . you can think of many with little difficulty.

Among the latter is VICKERS® . . . for long-established quality in Hydraulics. For more than a quarter century, the mark VICKERS® has signified superior products and services . . . with continuous pioneering in hydraulics research and development. As a result, the list of leading manufacturers who use Vickers Hydraulics continues to grow. You also can get the benefits of this dependable, long-established quality by specifying Vickers Oil Hydraulic Equipment.

VICKERS
Incorporated
DIVISION OF THE SPERRY CORPORATION
1428 OAKMAN BLVD.
DETROIT 32, MICH.

Application Engineering Offices:
ATLANTA • CHICAGO (Metropolitan) • CINCINNATI
CLEVELAND • DETROIT
HOUSTON • LOS ANGELES (Metropolitan) • NEW YORK (Metropolitan) • ODESSA
PHILADELPHIA (Metropolitan)
PITTSBURGH • ROCHESTER
ROCKFORD • SEATTLE
TULSA • WASHINGTON
WORCESTER

6396

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Business Pulse

(*Continued from page 78*)

Slight Decrease in Personal Income

Highly encouraging also is the indication of stabilizing tendencies in personal income. In March the Commerce Department estimated that income ran at a seasonally adjusted annual rate of $282.8 billion, only $200 million below that in February. By way of contrast, the average decrease in the preceding four months had been about a billion dollars monthly.

Retail-sales value in April was some three per cent greater than in March after seasonal adjustment and slightly greater than in April, 1953. This latter fact was especially heartening, inasmuch as in each of the first three months of this year sales compared unfavorably with the corresponding totals a year earlier. Cumulative retail sales for the first four months of the year ran about 2½ per cent below those in the like period of 1953. By contrast, industrial production ran some eight per cent lower. This points up the fact that end-product demand has held up relatively well and explains why the business decline has been so widely dubbed as an "inventory recession."

Inventory Reduction

Inventory liquidation continued through March, the latest month for which information is available. After seasonal adjustment, total business stocks stood at $80 billion as of the end of that month, some $350 million less than at the end of February and some $2 billion below the inventory total at the end of the third quarter of 1953, when liquidation began. It is interesting to compare the extent of inventory liquidation which occurred during the first eight months of decline in industrial production in 1953-54 with that which occurred during the first eight months of decline in industrial production in the 1949 recession. The dollar totals of liquidation are not appreciably different in the two instances, although the percentage decline has been smaller at all levels — manufacturing, wholesaling, and retailing — this time. In 1949, however, there is reason to believe that a substantial part of the inventory reduction was due to lower replacement costs, since prices dropped off rather appreciably. This

time prices have been steady, so that it is entirely possible that the percentage reduction in inventories in real terms has been as great or even greater.

Chicago Exposition

(*Continued from page* 56)

corrosion and is readily cast, forged, rolled, or stamped.

Highlights of the Taylor Fibre Co. exhibit were two completely new families of plastic materials—colored polyester fiberglass reinforced rods and a new series of paper-base laminates. Dobeckmun Co. showed its converter products made from DuPont Mylar, a new polyester plastic film recently placed in production. Firestone Plastics Co. exhibited its new Exon vinyl resins.

American Silver Co., Inc., exhibited its new thermostat metal strip and fabricated bimetal elements. Typical automotive applications for the thermostat metals are automatic chokes, exhaust manifold heat controls, circuit breakers, water temperature gages, and oil pressure gages.

Held concurrently with the exposition, the Basic Materials Conference was devoted to current developments in that field. Typical among these were: new metal forming methods; when and where to use non-metallic materials; adhesive bonding of metals and plastics; and how to set up a materials department.

Fiat Car

Has 200-Hp Gas Turbine Engine

(*Continued from page* 49)

front and rear wheels.

It is not yet certain what lines of further development will be followed but, in any case, Fiat has no intention of putting a turbine automobile into production within the immediate future. It was stated that after further tests the gas turbine might be used for industrial purposes. No military orders have been received and the Government has given no assistance in this development work.

The Fiat gas turbine powered car was illustrated on page 65 of the June 1 issue of AUTOMOTIVE INDUSTRIES.

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to April 7, 1954, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which was published in the May 15 issue, page 106, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Office of Defense Mobilization, covering the period from April 8 to May 17, 1954.

The figure appearing in parentheses is the percentage authorized in respect to actual fast tax write-offs.

BENDIX AVIATION CORP., Pioneer-Central Div., Davenport, Iowa
Aircraft parts—$50,424 (65)

BIRDSBORO STEEL FOUNDRY AND MACHINE CO., Birdsboro, Pa.
Steel castings—$300,000 (65)

EATON MANUFACTURING CO., Battle Creek, Mich.
Aircraft parts—$296,180 (65)

McDONNELL AIRCRAFT CORP., St. Louis, Mo.
Aircraft parts—$2,450,000 (60)

MOTOR WHEEL CORPORATION, Lansing, Mich.
Aircraft parts—$129,203 (65)

NILES-BEMENT-POND CO., Pratt & Whitney Div., Chandler-Evans Div., West Hartford, Conn.
Machine tools—$676,076 (65)

THE OHIO CRANKSHAFT CO., Cleveland, Ohio
Welded crankshaft forgings—$387,950 (65)

RHEEM MANUFACTURING CO., Chicago, Ill.
Ordnance—$133,997 (40)

SUN OIL COMPANY, Marcus Hook, Pa.
Petroleum refining facilities—$4,400,000 (65)

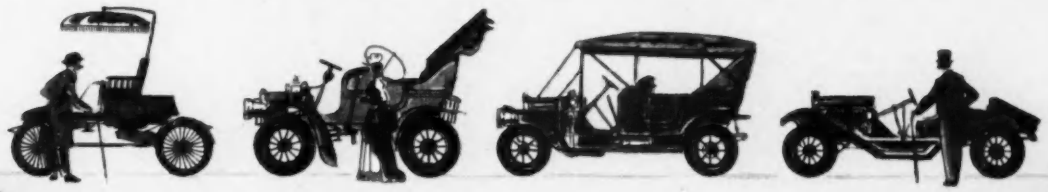
BOOKS ...

LUBRICATION OF INDUSTRIAL AND MARINE MACHINERY, *by William G. Forbes, revised by C. L. Pope and W. T. Everitt, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $6.50.* Addressed to the man responsible for the keeping and care of mechanical equipment, this book develops and evaluates—in lucid terminology—the fundamental facts basic to an engineer's understanding of present-day lubricating systems. The topics in the book are arranged in sequence, and basic principles are evolved in a manner calculated to avoid needless repetition. Relative to the specific lubricating process involved, the authors include expository descriptions of some of the more common types of basic mechanisms, such as compressors, bearings, gears and pumps.

DESIGNING BY PHOTOELASTICITY, *by R. B. Heywood, published by Chapman & Hall, Ltd., copies available from British Book Center, 122 E. 55th St., New York 22, N. Y. Price, $12.75.* The necessity for designing parts which are light and yet of sufficient strength makes it essential that the science of stress analysis should be applied. This book draws attention to the powerful photoelastic method of stress analysis, which by recent simplifications in technique has progressed from the field of pure research to that of applied research. Stress concentration factors are of considerable importance to the modern designer and values of these factors scattered throughout an extensive literature are correlated and presented in a form convenient for reference purposes.

ASME HANDBOOK, METALS PROPERTIES, *edited by Samuel Hoyt, published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Price, $11.00.* Compiled in this handy reference is specific information for the designer about the properties of the metals with which he works — properties such as strength, hardness, machinability, electrical conductivity, thermal conductivity, etc. In convenient chart and table form this book furnishes data on more than 500 metals in common industrial use—AISI steels, ASTM steels, cast copper alloys, aluminum alloys, tin, magnesium, etc. It gives the design engineer a practical fund of working data, from the end-quench hardenability of steels to the weldability of aluminum alloys and hot working temperature of copper alloys.

WE WERE THERE...



WE WILL BE THERE

Spicer has been through all the phases and cycles of automotive development during the past 50 years. Spicer has been a major factor in the progress of the motor vehicle from a clumsy, noisy machine to a sleek, fleet, worldwide method of transportation.

Spicer now looks forward to its second 50 years of participation in automotive advancements. Working together hand in hand with designers and engineers on the vehicles of the future, the Dana organization will continue to develop Spicer power transmission units that will maintain their reputation as

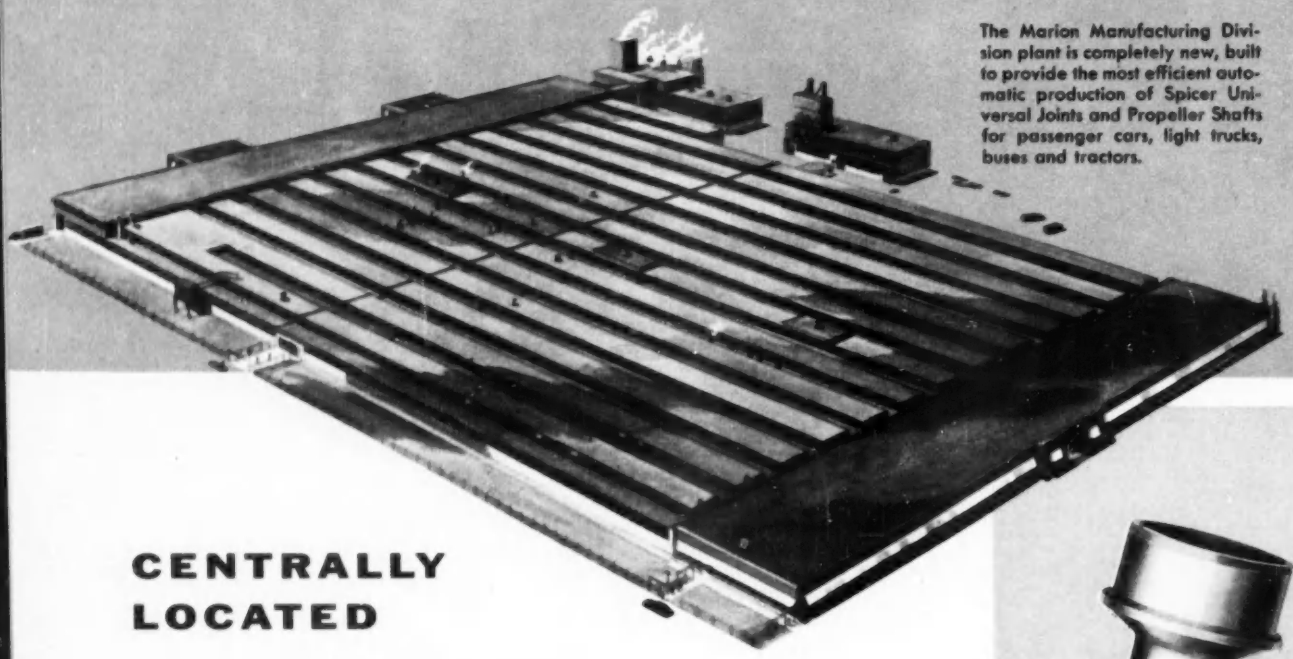
"The Standard of the Industry"

ENGINEERING

DANA

MANUFACTURING

THIS IS THE MARION MANUFACTURING DIVISION IN MARION, INDIANA



The Marion Manufacturing Division plant is completely new, built to provide the most efficient automatic production of Spicer Universal Joints and Propeller Shafts for passenger cars, light trucks, buses and tractors.

CENTRALLY LOCATED

and assuring a convenient, dependable source of supply for the automotive industry

For fifty years, Spicer Universal Joints . . . *first in the industry* . . . have been in volume demand because of outstanding service features:

1. True bearing alignment with rigid one-piece yoke design. *This rigidity is the essence of accuracy.*
2. Precision bearings with improved surface hardness and finish.
3. Dynamically balanced to exacting limits.
4. Uniform high quality propeller shaft tubing. *Steel meets our special specifications for Spicer propeller shaft needs.*
5. Wide selection of flange and yoke types and sizes to suit each individual requirement.

Spicer facilities are diversified and convenient, to fill your needs efficiently in power transmission units.

SPICER MANUFACTURING DIVISION
of Dana Corporation • Toledo 1, Ohio

50 YEARS OF Spicer SERVICE

ENGINEERING DANA MANUFACTURING

TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • BROWN-LIPE and AUBURN CLUTCHES • FORGINGS • AXLES • STAMPINGS • SPICER BROWN-LIPE GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • AIRCRAFT GEARS • WELDED TUBING

MEN *in the* NEWS

(*Continued from page* 25)

Minnesota Mining & Mfg. Co.—**George J. Wachholz** was made controller.

Tide Water Associated Oil Co.—**Ernest B. Miller, Jr.,** has been appointed a vice-president in charge of its Southern Div.

Lord Chemical Corp.—**Quentin S. Stump** has been made national sales manager.

TelAutograph Corp.—**Roy J. Keller** has been appointed executive vice-president in charge of all operations.

Chrysler Div., Chrysler Corp.—**Thomas S. Lawton** has been made comptroller.

Buhr Machine Tool Co.—**Edward A. Farwig** and **Otto Haisch** have been named chief engineer and assistant to the sales manager, respectively.

U. S. Rubber Co., Tires Div.—**James R. Tully** has been appointed manager of petroleum TBA sales.

Electric Regulator Corp.—**W. Hamilton Walter** has been named sales manager.

Great Lakes Steel Corp.—**Paul Carnahan** has been promoted to president.

Westinghouse Electric Corp.—**R. M. Wilson** has been appointed sales manager of defense products.

Minnesota Mining & Mfg. Co., International Div.—**E. Harlan Church** was elected treasurer, and **Eugene F. Kindler** was made assistant treasurer.

Chrysler Corp.—**John M. Haight** is now supervisor of employee services and **Cass V. Miller** has become supervisor of employment.

AiResearch Mfg. Co.—**Emery M. Ellingson** has joined the firm as sales coordinator for airline customers.

Flight Refueling, Inc. — **Walter Venghaus** is now manufacturing manager.

Conoflow Corp.—**E. K. Graham, Jr.,** has been named manager of technical services.

Link Aviation, Inc.—**Seymour Eddy** was appointed supervisor of methods and tooling fabrication; **C. W. Lundstrom,** supervisor of industrial engineering; and **William C. Ellison,** supervisor of the quality record group.

Cleveland Instrument Co.—**Robert A. Manes** was chosen vice-president.

(*Turn to page* 112, *please*)

MEN *in the* NEWS

(*Continued from page* 111)

Westinghouse Electric Corp., Aviation Gas Turbine Div.—**L. M. Henderson** has been appointed manager of operations, and **H. R. Arnold** has been named manager of foreign relations.

Clearing Machine Corp.—**James Bere** is now assistant general manager at the Hamilton, O., plant.

Ford Motor Co., Tractor & Implement Div.—**G. A. Hardesty** has been named manager, Production Programming and Control Dept.

Aerojet-General Corp.—**Gen. of the Army Omar N. Bradley (ret.)** and **Rear Adm. Calvin M. Bolster (ret.)** have joned the company's advisory board.

Rinshed-Mason Co., West Coast Div.—**D. E. Murphy** has been appointed general sales manager.

Lincoln Park Industries, Inc.—**John Delaney** has been made vice-president and factory manager, while **Robert G. Field** has become sales manager and administrative assistant.

National Lead Co., Baroid Sales Div.—**George B. Coale** has been appointed general manager.

Westinghouse Electric Corp., Aviation Gas Turbine Div.—**R. L. Wells** is now assistant chief engineer, and **T. A. Daly** has been named executive engineer. **G. W. Hardigg** has become manager of the Advanced Development Div.; **A. H. Redding**, Preliminary Design Div.; **H. B. Saldin**, Development Engine Div.; **P. G. DeHuff**, Production Engine Div.; **T. A. Daly**, Experimental Operations Div.; and **C. S. Cody**, Administrative Control and Services Div. of the Engineering Dept.

McCauley Industrial Corp.—**E. G. Ackerman** has been elected president; **John F. Haines**, vice-president and chief engineer; **Charles J. Schaefer**, secretary-treasurer; **Otis F. Forsyth**, assistant to the president; and **Walter Voisard**, field engineer.

Automotive Rubber Co., Inc.—**William C. Enright** is now sales manager.

Goodyear Aircraft Corp.—**George H. Bancroft** has been placed in charge of the company's new Detroit field office.

Radioplane Co.—**William Larrabee** has been promoted to executive vice-president; **Ferris M. Smith**, vice-president and assistant to the president; and **W. W. Tuttle**, vice-president in charge of operations.

National Screw & Mfg. Co.—**Donn D. Greenshields**, executive vice-president, has been elected vice-president of the Industrial Fasteners Institute.

Hydropress, Inc.—**Ernest E. Kugel** was elected a member of the board.

Pittsburgh Plate Glass Co., Paint Div.—**Howard J. Mather** was named general manager of industrial sales.

Goodyear Tire & Rubber Co.—**C. C. Gibson** has been advanced to manager of the Manufacturers Sales Dept.

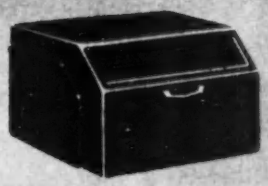
George L. Nankervis Co., Industrial Testing Devices Div.—**John E. Webster** was added to the sales-engineering staff.

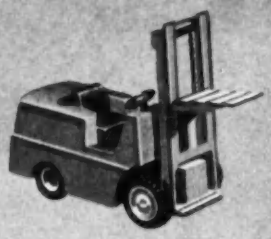
Chrysler Corp.—**Dr. M. W. Jocz** was appointed director of the Medical Dept.

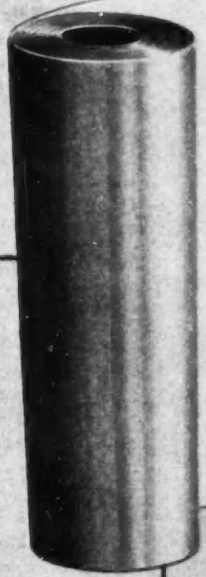
Robertshaw-Fulton Controls Co.—**George S. Chappars** has become director of advertising and public relations.

Thompson Trailer Corp.—**Russell A. Wallace** has been chosen manager of national fleet sales.

General Electric Co.—**Robert N. Tomb** was made manager of aircraft instrument sales in the Meter and Instrument Dept.

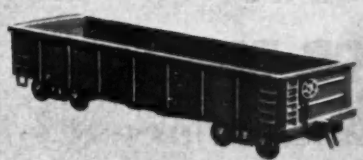


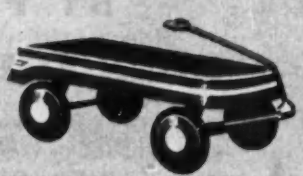


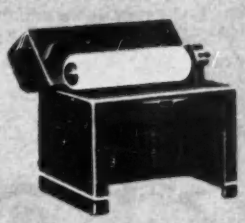


YOUR PRODUCTS ARE OUR BUSINESS, TOO!

Autos, appliances, transportation or farm equipment . . . if your products require flat-rolled steel, they deserve the best. And it's our obligation to see that you get the very best that 25 years' specialization in flat-rolled steel can provide.







GREAT LAKES STEEL CORPORATION

Ecorse, Detroit 29, Mich.

Sales offices in New York, Chicago, Cleveland, Grand Rapids, Indianapolis, Lansing, Philadelphia.

A UNIT OF

NATIONAL STEEL CORPORATION

Industry News

(*Continued from page* 23)

This would waive criminal liability of both dealers and manufacturers if a clause is inserted in the contract defining the dealer as a retailer exclusively and providing penalties for wholesaling.

Congressmen also are showing unusual interest in the industry with resolutions asking for FTC investigations or actually proposing laws governing the contractual relationship between factory and dealer. A case in point is a recent proposal that Congress make it an unfair trade practice for a manufacturer to require a dealer to accept goods not specifically ordered and also to make it illegal for the factory to withdraw the franchise or distribution rights from a dealer who refuses to accept more products than he needs.

Labor Difficulties

The automobile industry this year is preparing for what might be a troublesome time in 1955 when current five-year labor contracts expire. The guaranteed annual wage will be the principal source of contention, but there undoubtedly will be other demands also.

A more near-term disruption from labor trouble might come if the steel industry is struck this summer when the current contract expires. Indications now are that the strike is not likely, but some car companies are stepping up their steel orders just in case.

Giant Magnesium Mill Is Dedicated by Dow

Expecting a big rise in the use of magnesium during the next several years, Dow Chemical Co. last month dedicated what it describes as the first plant in the world to mass-produce magnesium sheet, plate, and extrusions. The $40 million plant, located at Madison, Ill., will have a capacity to produce 66 million lb of extrusions, finished sheet and plate and foundry ingots annually.

The giant mill will be able to turn out six-ft wide sheets, some as long as 5000 ft, compared with four-ft wide and 12-ft long sheets at the company's Midland, Mich., plant, which is being closed.

While Dow's magnesium production accounts for only 10 per cent of its total volume, the company sees a

(*Turn to page* 116, *please*)

Auto-Lite is world famous for long life, performance and economy

Around the world, more than 400 products of Auto-Lite are used day and night in cars, trucks, planes, boats and industry . . . convincing proof of the outstanding quality made possible by Auto-Lite advanced engineering and precision manufacturing. So to get the best in long life, in power and performance and in economy, it pays to insist on world famous Auto-Lite products.

Manufacturers of

BATTERIES • BUMPERS • FUEL PUMPS • HORNS • GENERATORS • LIGHTING UNITS
SPEEDOMETERS • SPEEDOMETER CABLE • SWITCHES • STARTING MOTORS
INSTRUMENTS & GAUGES • IGNITION UNITS • MOULDED PLASTICS
WINDSHIELD WIPERS • WINDOW LIFTS • SEAT MOVING MECHANISMS • HUB CAPS
WIRE & CABLE • SPARK PLUGS • METAL FABRICATED ASSEMBLIES • GRAY
IRON CASTINGS • ZINC & ALUMINUM BASE DIE CASTINGS

THE ELECTRIC AUTO-LITE COMPANY • TOLEDO 1, OHIO

Industry News

(*Continued from page* 114)

big potential in the future of the metal. It has increased its magnesium sales force by 50 per cent in the last two years, as well as its research facilities. Dow is the only sizable producer of magnesium for civilian uses in the country. Half of its total production is currently being stockpiled by the Government.

Westinghouse Plays Major Role in Atomic Power Plant Project

Work is proceeding rapidly on the nation's first central station atomic power plant to be built at Shippingport, Pa., near Pittsburgh. It is a joint project of the Atomic Energy Commission and the Duquesne Light Co.

Westinghouse Electric Corp. is developing and building the reactor portion of the plant under contract to the AEC. Duquesne Light Co. will design and construct the turbine generator portion and will operate the entire plant.

Components of the plant include a building for fuel handling; the atomic reactor and heat exchangers; maintenance building and overhead traveling crane; turbo-generator building; switchyard containing transformers and circuit breakers; and transmission lines. Also scheduled is a building containing shop and administrative facilities.

The plant will be built to the following general specifications:

1. Generation of at least 60,000 kw of useful electric energy.
2. Use of light water-cooled and moderated, slightly enriched uranium-type reactor.
3. Six hundred psi saturated or higher steam conditions.
4. Fuel element life as long as possible between chemical reprocessing.
5. Refueling with minimum shutdown period.
6. Simplified reactor control system.
7. Central station type turbine and electric generating equipment.
8. Conventional central station steam, electric, and other auxiliary systems.
9. Commercial standards of equipment.
10. Use of concrete for shielding.
11. Minimum possible construction cost of the plant.
12. Minimum possible operating cost of the plant consistent with the above requirements.

Willys Union Petitions For Car Franchise

Willys Motors union members may go into the business of selling their employer's products. The Willys unit of UAW-CIO Local 12 at Toledo has voted to invest about $300,000 in a new company which has asked permission to take over the Ohio wholesale distributorship for Kaiser and Willys cars.

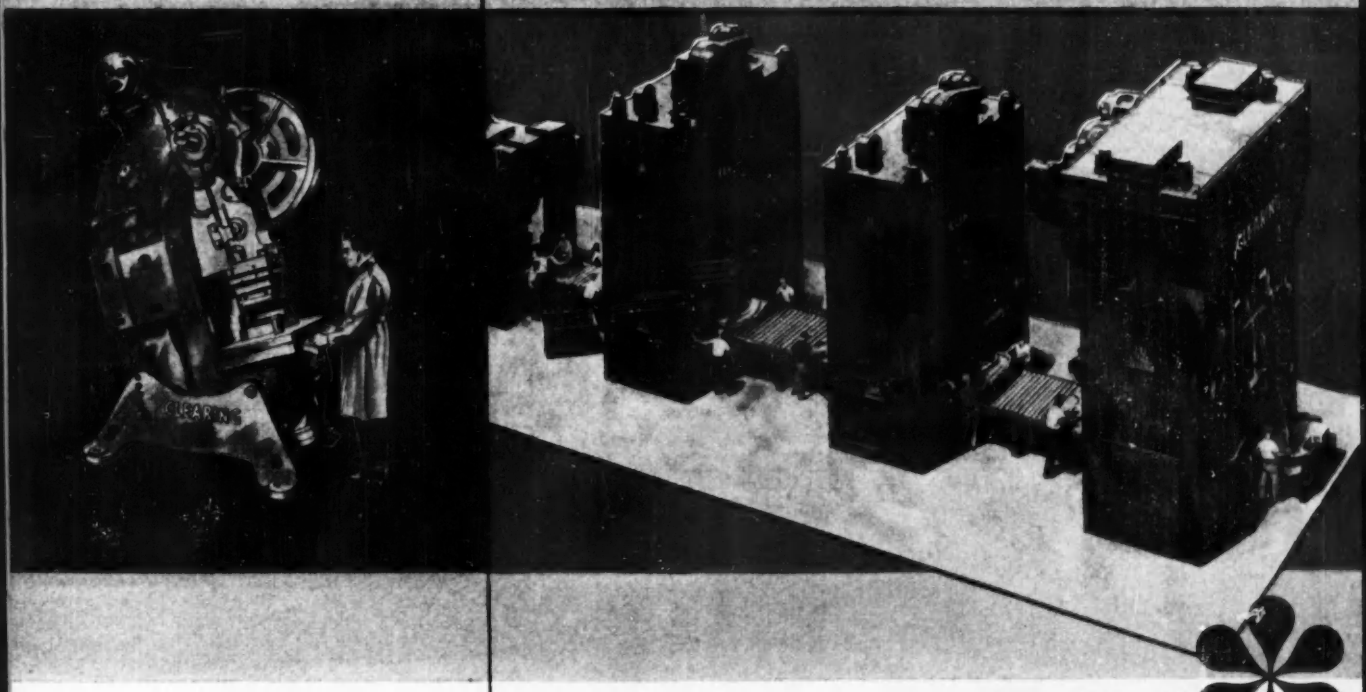
Toledo businessmen would invest the balance of the $1 million capitalization. Kaiser Motors, Inc., is studying the request for the franchise but has not made any decision on the proposal.

Chrysler Pays $11 Million In Vacation Pay To Aides

About 125,000 Chrysler Corp. hourly employes have received approximately $11 million in lieu of vacations. The payment is made annually to employes who have at least one year's seniority and who have worked for the company during eight months of that time.

(*Turn to page* 120, *please*)

for a single press | or an entire stamping plant...



Plan for increased productivity with C.P.C.

There's only one way to beat the creeping paralysis of declining production. That's with planning—planning that combines realism with vision, experience with fresh ideas.

Clearing has geared its engineering efforts to the demands of the metalforming industry for higher productivity. Our staff of engineers have worked directly on hundreds of press installations—worked closely with the top firms in every branch of the metalforming industry. These men, *Clearing Productivity Consultants, are shirt-sleeve thinkers; they have ideas based on direct experience in the field. Their services are available to your organization to help you plan for increased productivity.

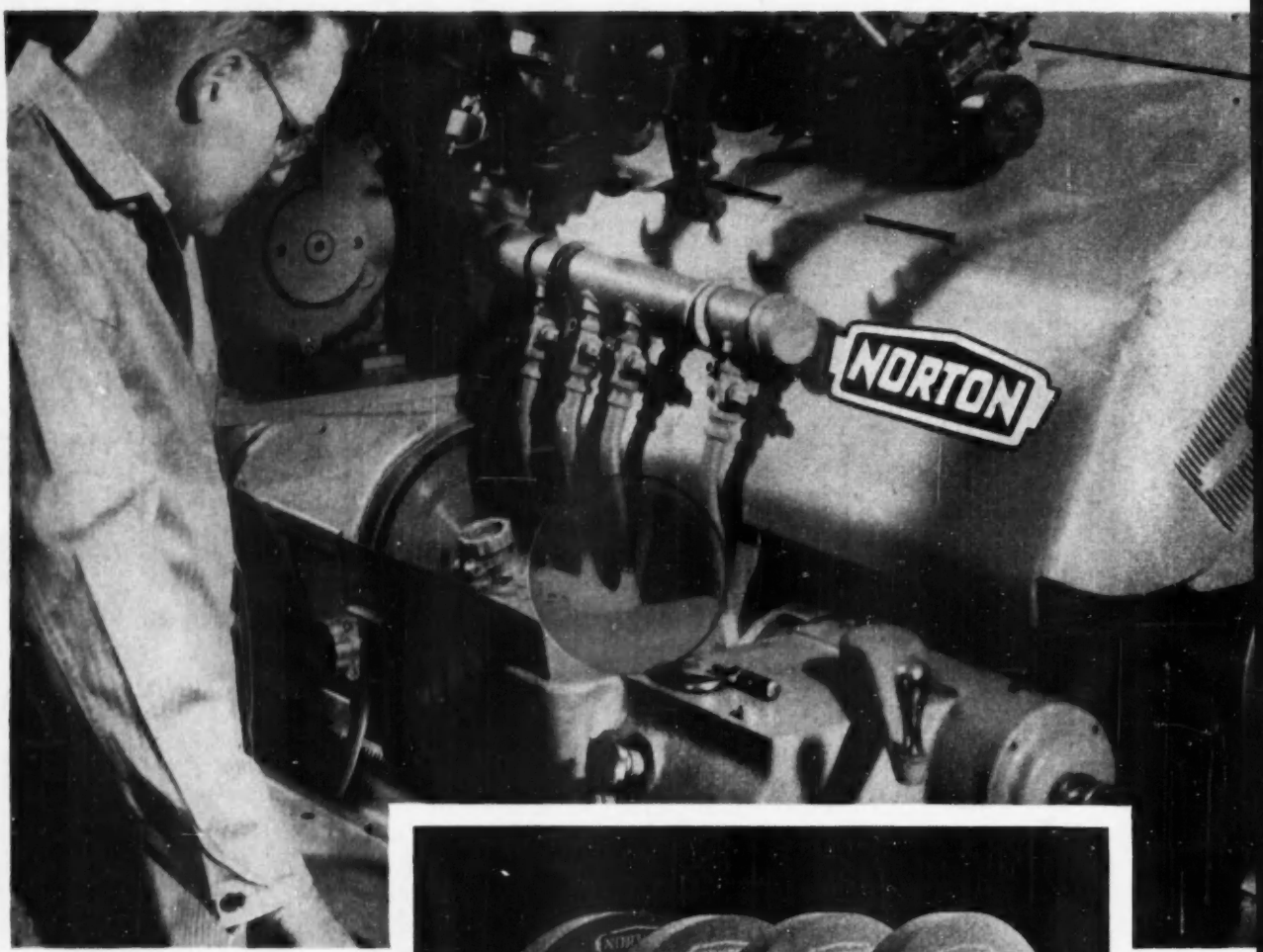
Whether your requirements call for a single press or an entire stamping plant, there is a C.P.C. ready to dig into your problem with you. Feel free to call on Clearing Machine Corporation today.

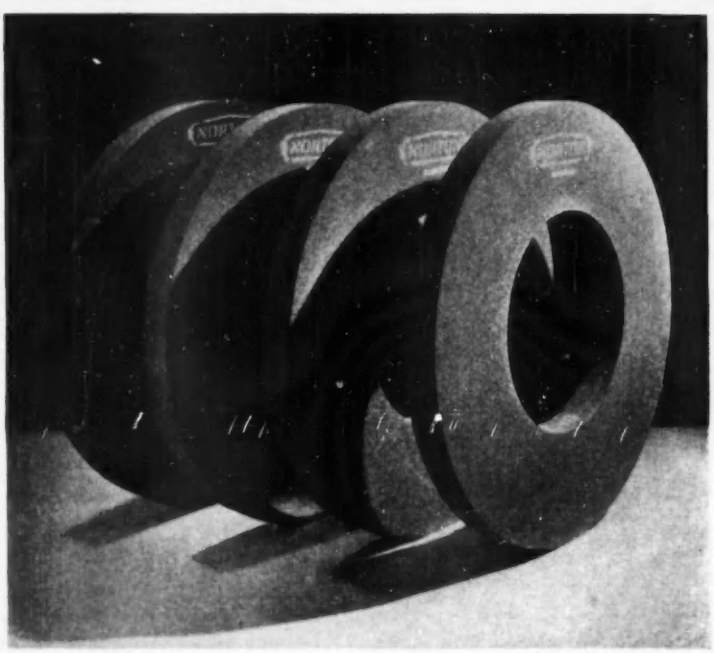
CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION • 6498 West 65th Street, Chicago 38, Illinois • HAMILTON DIVISION, Hamilton, Ohio

NOW...





Top Performance Multiplied By Four. Grinding four diameters at once, four new Norton G Bond ALUNDUM* wheels are delivering identical precision performance, cutting fast, free and cool and wearing at the same uniform rate. "Touch of Gold" advantages like these eliminate fussing with adjustments, save time and money, safeguard quality. The machine is a Norton Type CM-1 Heavy Duty Semiautomatic Multi-Wheel Grinder that makes four *or more* cuts in a single plunge-grind cycle.

New Norton G Bond Wheels

insure uniform, multi-wheel grinding... one of many "TOUCH of GOLD" advantages

You know what happens when even one wheel in a multi-wheel grinding setup wears slower or faster than the rest. At best, it requires constant watching and adjusting. At worst, it can cause costly delays, and might even spoil the work.

You can get rid of these particular threats to your production, once and for all. Built by Norton's exclusive precision-processing, the new G Bond wheels are really uniform in structure, within each wheel and from wheel to wheel. That's why you can count on identically marked G Bond wheels for identical performance — one of the most valuable benefits you can bring to any multi-wheel grinding job.

Added to this, the new Norton G Bond, designed for precision and semi-precision grinding, is the most radically improved vitrified bond ever developed. Holding each abrasive grain just long enough for maximum cutting action, it assures a constant grinding surface of fresh, sharp cutting edges. As a result, the success of G Bond wheels has been truly sensational, and their reputation for outperforming and outlasting ordinary wheels is growing every day.

Remember: when you standardize on G Bond wheels the product-improving, cost-cutting "Touch of Gold" performance that is built into *each single wheel* is duplicated by *every other wheel* in a setup.

G Bond wheels bring you these big advantages

Matchless uniformity • Do more work per wheel
Dress easier — more pieces per dressing
Hold shape — better for form grinding
Hold corners better

Your Norton Distributor

has the types and sizes of G Bond ALUNDUM wheels you need for single or multi-wheel grinding. Ask him about arranging a test in your plant. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

Making better products . . . to make other products better

NORTON

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

Industry News

(*Continued from page* 116)

Patent Problems Aired At Seminar in Detroit

Engineers and others interested in the subject of patents and patent law met in Detroit recently for the first Seminar on Science, Invention, and Atomic Research held in the area. The meeting was sponsored by NAM, AMA, APMA, and other interested organizations.

At the press conference preceding the meeting, Robert C. Watson, commissioner of patents, pointed out that the major problem confronting the Patent Office and plaguing industry as well as private inventors is that of a too limited budget in the face of an increasing number of patent applications. At the present time, the Patent Office has a backlog equivalent to around 11 months of search, while the complexity of current patents is such that an examiner is able to clear only 104 applications, on the average, per year.

It was also disclosed at the press conference that apparently none of the companies now engaged in producing a nuclear powerplant for aircraft had yet gone beyond the exploratory phases of the problem, although considerable advances have been achieved. One of the major problems remains that of suitable shielding against radiation.

New Plans Proposed For American Bantam

New plans are reportedly in the works for American Bantam Car Co., which has been under Federal receivership since 1949 because of a $337,381 tax debt. A petition filed in Pittsburgh Federal court by the sole trustee of the corporation proposes that the company be reorganized, merged with another, or liquidated.

Melvin Zurn, the trustee, said there are claims of $775,000 against the 14-acre property and that the company has been losing $11,000 monthly. The plant is not operating, and efforts to sell it have been unsuccessful, Zurn stated in the petition.

If the corporation is reorganized, Class A stock would be exchanged on a share-for-share basis for new common stock, according to the petition filed in court. American Bantam recently said it would cancel 540,000 Class B shares which Monroe Auto

(*Turn to page* 122, *please*)

Now!

AIR-POWER steering

Bendix-Westinghouse

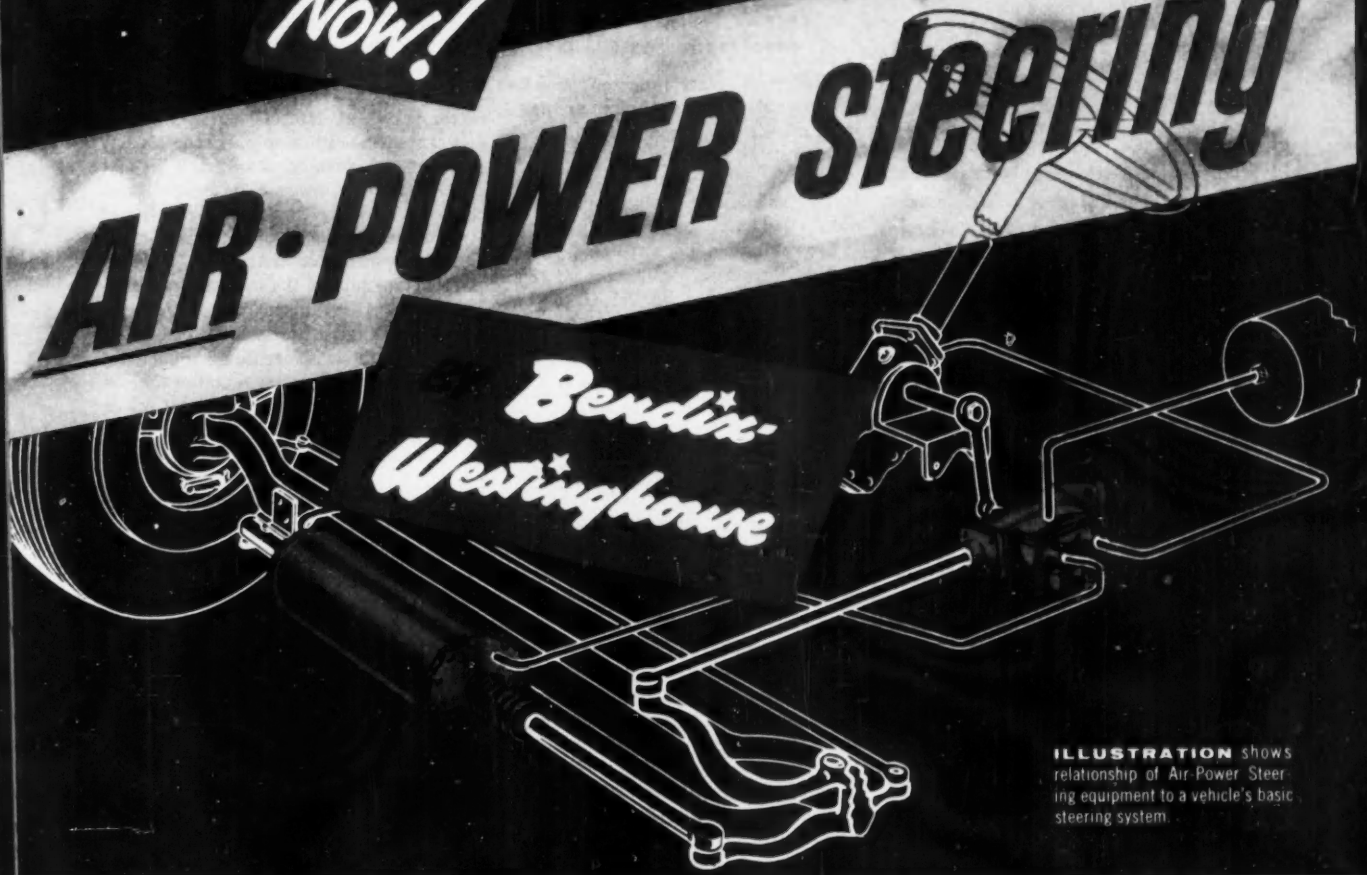


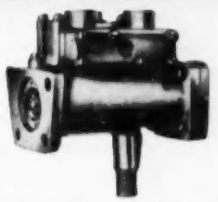
ILLUSTRATION shows relationship of Air-Power Steering equipment to a vehicle's basic steering system.

The only power steering that requires no additional power source!

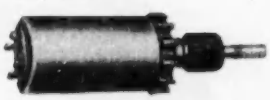
Now you can make the compressor in the air brake system of your trucks or buses pay off two ways—not only as a medium for sure, effortless stops, but as the power source for smooth, effortless steering as well! That's because new Bendix-Westinghouse Air-Power Steering uses the basic air brake compressor as its source of power. Thus, you benefit cost-wise by buying *one* power system *only*—you step up performance because no matter how much weight they are carrying or how slowly they are rolling, the grueling effort required to handle big equipment is eliminated completely—steering, in fact, becomes so easy that even your largest, heaviest models will handle like toys!

For Bendix-Westinghouse Air-Power Steering takes the drudgery out of driving, lets the driver sit back in comfort and "guide" even the biggest jobs—on the highway or off the road, in rain or shine—with complete confidence and without fatigue! Yes, regardless of weight, speed, tire size, road conditions, weather, traffic or size of driver, Bendix-Westinghouse Air-Power Steering provides new standards of safety, ease and efficiency of operation on any hauling or transit job!

Investigate the advantages of Air-Power Steering on your vehicles. Write direct to the factory and learn the complete story of how you and your customers can benefit with this new Bendix-Westinghouse development.



CONTROL VALVE is the heart of the system. Operates in response to the force developed between the steering gear pitman arm and the steering knuckle arm. Delivers compressed air to power cylinder only when steering wheel rim pull exceeds 6 to 10 pounds.



THE DOUBLE-ACTING POWER CYLINDER provides adequate, dependable power for steering assist—is designed to offset road shocks under rough operating conditions.

Bendix-Westinghouse

AUTOMOTIVE AIR BRAKE COMPANY

BENDIX-WESTINGHOUSE AIR BRAKES REG. U.S. PAT. OFF.

GENERAL OFFICES AND FACTORY—ELYRIA, OHIO • BRANCHES—BERKELEY, CALIFORNIA AND OKLAHOMA CITY, OKLAHOMA

Industry News

(*Continued from page* 120)

Equipment Co. agreed to turn back following a settlement between the two companies. Monroe, which managed Bantam for two years starting in 1948, earlier this year agreed to pay $310,000 to Bantam and dropped its claims totaling $125,000 against the company.

Former Willys President Involved in Tax Claim

The recent tax judgment against Charles E. Sorensen, former president of Willys-Overland Motors, who at one time held an option to buy stock from the company at $3 a share, is not expected to have any noticeable effect on the bonus plans at other automobile companies, which pay out in stock. Sorensen and his wife were ordered by the U. S. Tax Court last month to pay approximately $384,000 in additional taxes and $150,000 in interest for the years 1946-1949.

Sorensen in 1944 was given a 10-year contract as president of the company at $52,000 a year and granted the option to purchase 100,000 shares of common stock in Willys at $3 a share. However, he retired from the presidency two years later and sold the options to others.

The court held that money derived from the sale of the options was compensation, not incentive, and constituted ordinary income instead of a capital gain. Sorensen reportedly listed the receipts from the option as capital gains, which carry a lower tax rate.

Ford To Enlarge Plant For Plastic Operations

Ford Motor Co.'s Brooklyn, Mich., plant, which has been in operation since 1939, will be enlarged for the production of plastic parts and present manufacturing facilities of that plant will be transferred to Ypsilanti, Mich. The Brooklyn plant has been manufacturing distributors, and starter and spotlight switches.

Tinted Glass Improves Vision, Chrysler Says

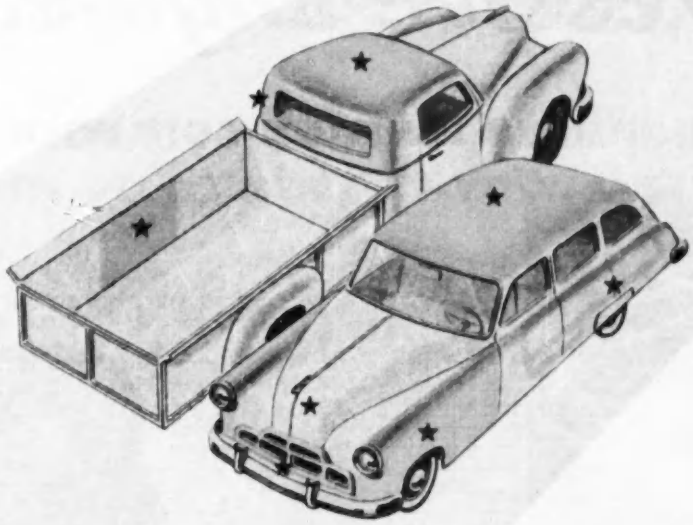
The tinted window controversy has popped up again. Recent stories in medical journals claiming such glass on automobiles reduces visibility by as much as 30 per cent were refuted by Chrysler engineers who conducted another study of the subject.

Car companies have maintained that tinted windows improve vision because the eyes are not subject to as much glare during daytime as they are with ordinary glass. In the latest study, Chrysler found that it takes several hours to restore normal acuity in darkness after the eyes are exposed to the sun for some time.

Chrysler Dealers Hold Sales Confab Via Video

Chrysler Division's sales program for the remainder of this year was outlined last month to more than 3000 of its dealers in 26 major cities over a closed circuit television channel by E. C. Quinn, president of the division. While other Chrysler Corp. divisions in the past have utilized television for their sales conferences, this was the first time the Chrysler Div. made use of closed-circuit TV for such a meeting.

(*Turn to page* 126, *please*)



Here's Where General's "Syloy*" Reinforced Fiberglas Improves Appearance and Performance . . .

★ *Fenders and panels*

★ *Station wagon rail decorative trim*

★ *Tops and inner liners*

★ *Grills and fan shrouds*

General's custom molded "Syloy" fiberglas laminates have taken to the road in trucks and autos in the form of cab panels, body tops, dashboards, decorative trim and other parts calling for tough, maintenance-free qualities with high surface appeal.

Manufacturers have discovered the amazingly versatile qualities of this road-proved product . . . it is lighter than steel, immune to weathering and chemicals, incredibly resistant to bending and hard blows, and will hold color for the life of the product.

In addition to custom molding of Syloy, our package design and manufacturing applies to molded and extruded rubber and plastics, metal stampings, vibration control units, oil and hydraulic seals, and sponge rubber items.

For literature or information from our field representative just fill out the coupon below.

*T. M. G. T. & R. Co.

"From Plans to Products in Plastics and Rubber"

THE GENERAL TIRE *Industrial Products Division*
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- ☐ Send descriptive literature on fiberglas laminates
- ☐ On other custom products
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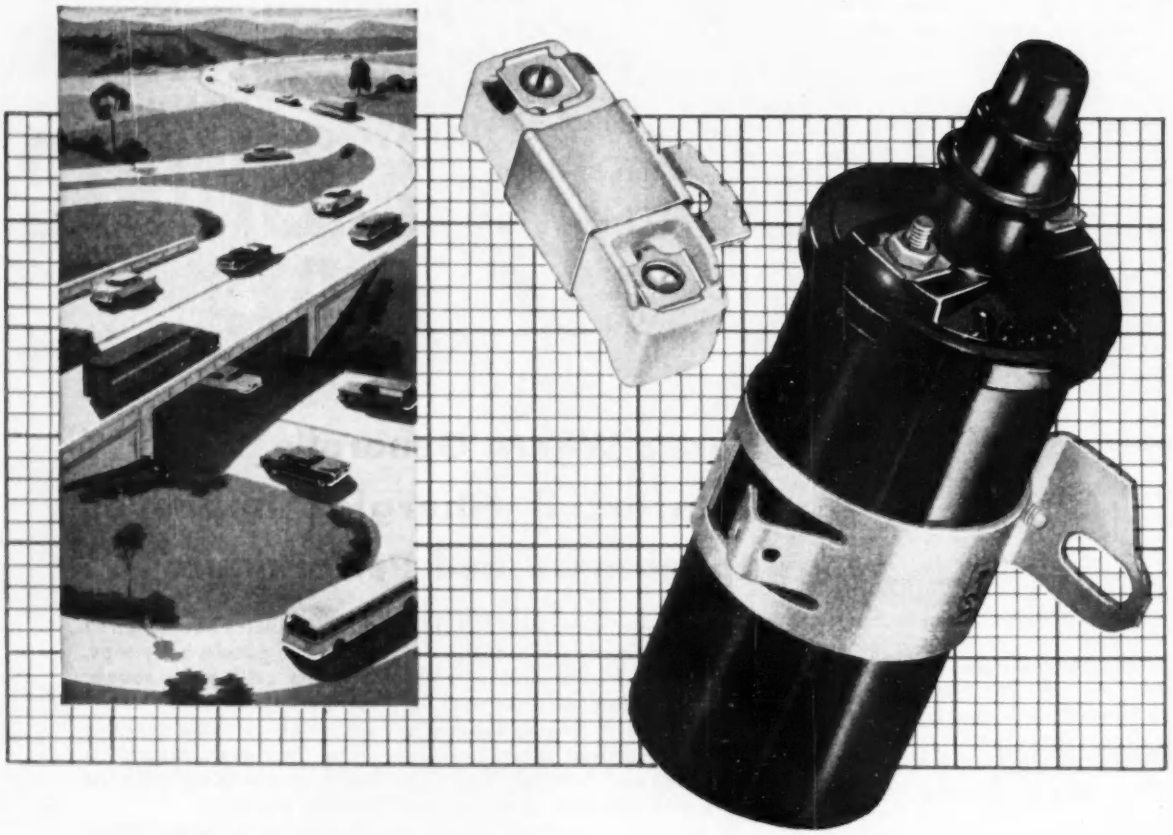
AI-6-54

Progressive Engineering

NEW IGNITION COIL WITH RESISTOR



Here at Delco-Remy, Progressive Engineering is a fixed principle, guiding us toward our constant objective—the development of improved automotive electrical systems and their components.

For an example of Progressive Engineering, take the special ignition coil and its companion resistor—two of the many specially designed units in the Delco-Remy 12-volt electrical system for passenger cars.

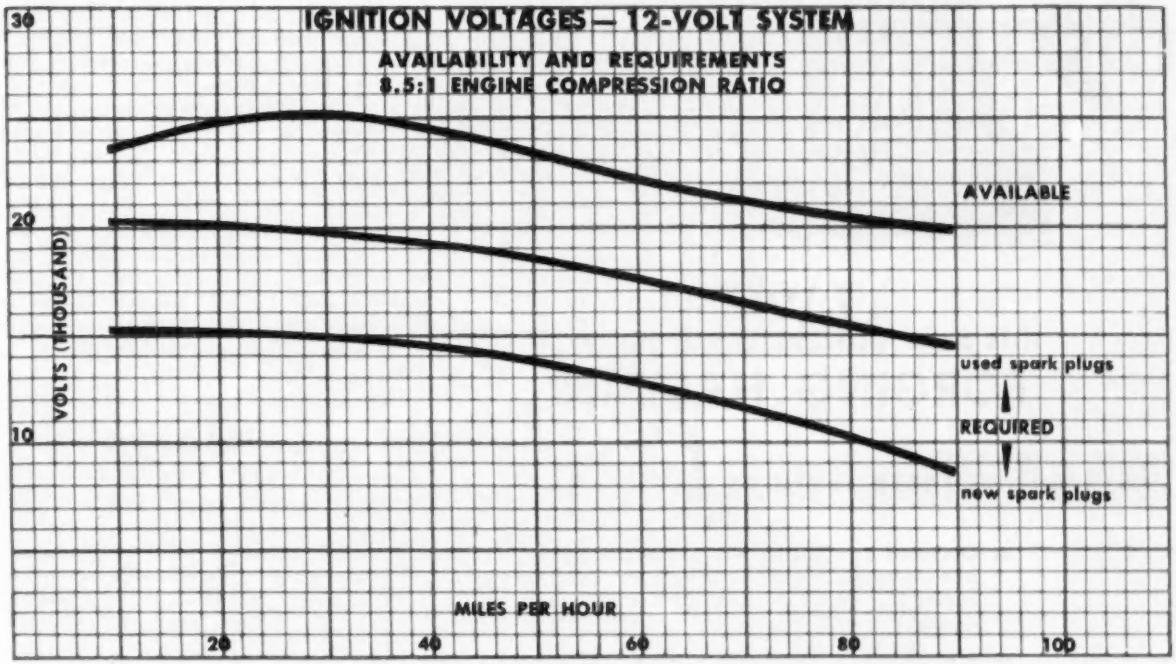
One of the most important advantages of the 12-volt system is its ability to deliver higher ignition voltage at all engine speeds. This gain is chiefly due to the new coil and resistor design. The 12-volt ignition system, as engineered by Delco-Remy, greatly accelerates energy build-up so that a high reserve of ignition voltage is maintained even with worn spark plugs and under difficult operating conditions. This improvement in ignition performance helps to make possible thousands of miles of smooth uninterrupted operation with newly developed engines of extra-high compression and horsepower.

A Progressive Engineering feature is the use of the series resistor in the primary circuit between battery and coil. By dissipating heat that would otherwise be generated in the coil, the resistor makes possible greater voltage output without an increase in coil

AUTOMOTIVE, TRACTOR AND MARINE ELECTRICAL EQUIPMENT

Makes the Difference

ASSURES HIGHER VOLTAGE AT ALL ENGINE SPEEDS WITH DELCO-REMY 12-VOLT SYSTEM



size. During cranking, the resistor is automatically by-passed, and the coil is connected directly to the battery. This makes full voltage available for ignition and thus helps to assure quicker, easier starts. As soon as cranking ends, the resistor circuit is restored for normal operation. Because of its constant-resistance characteristic, this resistor protects the distributor contact points from excessive current at low temperatures.

It is through such Progressive Engineering that Delco-Remy succeeds in being always abreast—usually ahead—of developments in the automotive industry. Whenever the need arises for further advances in electrical equipment, count on Delco-Remy to be ready.

Delco-Remy

DIVISION, GENERAL MOTORS CORPORATION, ANDERSON, INDIANA

AUTOMOTIVE, TRACTOR AND MARINE ELECTRICAL EQUIPMENT

Industry News

(*Continued from page* 122)

Kaiser Industries Mark 40th Year in Business

Henry J. Kaiser Co. is observing its 40th year in business in an anniversary report combining the production and financial activities of all Kaiser-managed industries. The company now has approximately 68,000 employees sharing an annual payroll of $271 million; operates 116 plants and facilities; makes annual purchases of more than $543 million in supplies and services; and turns out more than 290 products and services in a variety of fields.

The Kaiser organization today includes such diversified companies as Kaiser Aluminum & Chemical Corp.; Kaiser Steel Corp.; Kaiser Motors Corp.; Willys Motors, Inc.; Permanente Cement Co.; Kaiser Gypsum Co., Inc.; Kaiser Metal Products, Inc.; Consolidated Builders, Inc.; Chase Aircraft Co., Inc.; Permanente Steamship Corp.; and Sand & Gravel and Kaiser Engineers Divs. of Henry J. Kaiser Co.

Vast Highway Network Seen By Ford Official

A highway network that will span the nation, extend to Alaska and possibly the length of South America, and which will eventually cut automobile travel in half is envisioned by L. E. Briggs, treasurer of Ford Motor Co. To meet this challenge, the automobile industry is working on ideas to make cars of the future safer vehicles.

While the industry has the technical knowledge to accomplish so-called "automatic driving" which reportedly would let the driver sleep at the wheel, Briggs said such a system is not feasible at the moment. He noted that Ford is exploring a means of detecting electronically the symptoms of drowsiness which would warn the driver when it's time to pull off the road.

Detroit Harvester Doubles Manufacturing Facilities

A new plant, which is expected to double manufacturing facilities, has been purchased by Detroit Harvester Co. for its Warner Div. The plant is located on a 20-acre site in Detroit and has 104,000 sq ft of floor space.

(*Turn to page* 129, *please*)

McLouth
STAINLESS
Steel

High quality stainless sheet
and strip steel . . . for the product
you make today and the
product you plan for tomorrow.

McLouth Steel Corporation
DETROIT, MICHIGAN
Manufacturers of Stainless and Carbon Steels

Industry News

(*Continued from page* 126)

GM's Turbine Test Building Resembles Industrial Plant

Continuous improvements at the General Motors Turbine Testing Building, located at the company's Technical Center, have made it one of the most flexible and completely equipped structures in the industry. Today, less than one year after it was first put into operation, the building has facilities for testing virtually all types of gas turbines, ranging from small automotive units to large jet aircraft power plants.

The 240-ft long building, which resembles a small industrial plant, contains seven test cells and is equipped with elaborate and versatile instrumentation, designed not only for recording data during turbine tests, but to avoid hazards. The ventilating system can change the air completely in two minutes to prevent any buildup of explosive vapor mixtures in the test cells, and a water deluge system can wash any fuel spillage into the sewer system.

An interesting feature of the building is its air handling system by which air is drawn inside through a loft as wide as the cell itself. The air passes through fiberglass silencing units and can be ducted through a measuring tank into a gas turbine engine. Intake of the five small cells is designed for a rate of 15 lb of air per second, while rate for the two larger cells is 200 lb per second.

Exhaust gases pass through a water cooler into a vertical silencer and emerge through a high stack outside the building. This prevents recirculation of the gas back into the air intake loft on the other side of the building.

Export Sales of Vehicles Rise 14.6% Over Last Year

While factory sales of vehicles in the first four months were under the same period a year ago, export sales rose 14.6 per cent from 124,231 units to 142,356. The export figure represents six per cent of total sales during the first four months, compared with 4.8 per cent in the same period last year.

Total vehicle sales in the four-month period amounted to 2,350,044 compared with 2,572,390 units in 1953. Automobiles numbered 1,967,434; trucks, 381,208; and buses, 1402.

(*Turn to page* 130, *please*)

Industry News

(*Continued from page* 129)

Republic Aviation Studies Plastic "Fences" on Wings

Plastic wing "fences," made with epoxy-resin plastic molds, are among latest experimental developments in reinforced plastics engineered at Republic Aviation Corp. The fences are said to help solve an air-flow problem which arises in the use of very high-speed swept-back wings, especially if the wings—as in Republic's RF-84F—house the jet-engine air intake ducts.

The wing on the RF-84F has four rib-like fences running in the direction of the plane's flight. These channel the air across the wing and increase lifting efficiency, the company states.

Republic has been testing fences made of glass-cloth polyester laminations for the RF-84F. Both weight and cost savings are said to result.

The experimental plastic fences were produced with eight sets of three-piece glass-reinforced epoxy-resin molds. They are held to a limit of .020 of an inch in deviation from the fence center line, even for the eight-ft length, the company reports.

Republic has engineered other improvements in its plastic tooling program. In one development, large stretch-forms used to shape sheet metal such as wing "skins" are being made as laminated epoxy shells.

In another tooling development, Republic is substituting laminated plastic (paper-based phenolic) tubing for metal as reinforcing members in plastic jigs and fixtures. The tubing is fastened to the plastic tool with epoxy paste to eliminate welding.

Republic has developed also a reportedly faster method of fitting bushings to some of its plastic tools. This involves coating a knurled bushing with a thixotropic epoxy and press-fitting it into a hole. In the process, the knurling scores the hole-wall.

When the resin dries, the result is a firmly anchored bushing. The degree of accuracy in bushings mounted this way is plus or minus .005 of an inch, according to the company.

Technical Papers, Exhibits To Highlight AHS Meeting

The 10th Annual Forum of The American Helicopter Society, to be held in Washington, D. C., on June 24 to 26, will feature a series of papers on topics of interest to the industry. Supplementing the technical sessions throughout the Forum will be an exhibit of displays by helicopter manufacturers and subcontractors.

Automotive Firm Develops Shells for Atomic Cannon

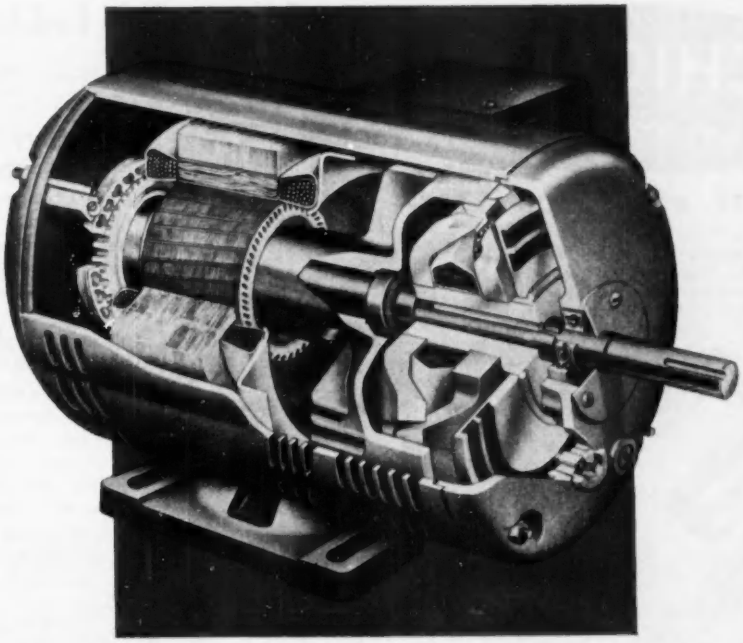
Shells which can be fired from the 280 mm atomic cannon are being produced by the Auto Specialties Mfg. Co. in St. Joseph, Mich., under a contract with the Army. The company has been working on development of the shells secretly for several years and was awarded a production contract in 1952.

"Baby" Reo Car Sought By Firm

A 238-lb "baby" car born in 1906 is being sought by officials of Reo Motors, Inc. Any reader of AUTOMOTIVE INDUSTRIES who might know its whereabouts is urged to contact the company at 1331 S. Washington Ave., Lansing, Mich.

The "Baby Reo" is a miniature replica with all the details of the original gasoline model displayed by the company in 1906 at the New York Auto Show. The company would like to have the car for exhibition during its 50th anniversary this year. After the show, it was exhibited throughout the country, but it dropped from sight about 1936.

(*Turn to page* 132, *please*)



Now—Dynamatic Makes Ajusto-Spede Motors Available in Fractional Horsepower Sizes

The addition of 5 new fractional horsepower models to the existing Ajusto-Spede line extends the available range of these adjustable speed drives from ¼ horsepower to 75 horsepower.

This compact, self-contained unit is an integral combination of AC constant speed induction motor, eddy current coupling, and electronic control.

All fractional horsepower Ajusto-Spedes are rated 115/220 volts, single phase or 220/440 volts, 3 phase. Sizes are ¼, ⅛, and ½ horsepower at 1600 RPM; ½ and ¾ horsepower at 3200 RPM.

If you have fractional horsepower adjustable speed drive problems, write for a copy of the Dynamatic Bulletin FAS-2. Bulletin GB1, which describes other Dynamatic Eddy Current products, is also available.

Ajusto-Spede Advantages:

- ★ **Constant torque speed range: 10 to 1 with 1600 RPM Ajusto-Spedes; 20 to 1 with 3200 RPM units.**
- ★ **Control accuracy: 2 per cent of top speed at any point within the speed range.**
- ★ **Minimum wiring to power line.**
- ★ **Remote "one knob" control operation up to 100 feet.**
- ★ **Rugged plug-in type integral one-tube electronic control.**
- ★ **Permanently sealed grease-packed bearings.**
- ★ **Power output shaft extension at both ends of drive.**

DYNAMATIC® **DIVISION EATON MANUFACTURING COMPANY**

KENOSHA, WISCONSIN • General Offices: Cleveland, Ohio

Industry News

(*Continued from page* 130)

Weighty Topics Scheduled for Management Conference

Seven company presidents and 11 other business and industrial executives will address the American Management Association's General Management Conference, to be held June 21-23 in New York City. AMA also will hold its annual business meeting in conjunction with the conference.

How business can tighten its belt for the current readjustment and at the same time be ready to capitalize on future expansion opportunities will be the chief problem before the conference. Speakers will emphasize both the long- and the short-range aspects of finance, marketing, pricing, inventories, and other operating problems.

A full afternoon will be devoted to a case study illustrating how a company plans its year in terms of the next decade. Harold B. Smith, president, Illinois Tool Works, and four of his associates will describe the job of planning, managing, and measuring men, markets, machines, and money.

William F. McDonald, president, E. F. Houghton Co., will tell how his firm controls inventories for balanced production, using techniques recently developed to minimize the risks of dependence on human judgment. Other speakers will take up such topics as master-planning a small company's future, management criteria for staff functions, getting the most from inventory investment, organizing for growth and change, and defining objectives in management development.

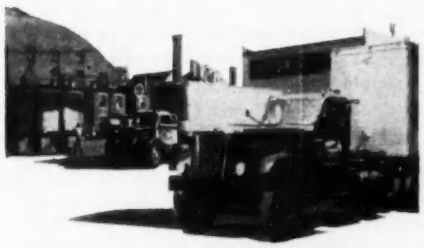
Rover Unveils Gas Turbine for Industrial Purposes

Rover Co. presented a new industrial gas turbine at the British Industries Fair, Birmingham, which opened recently. The IS/60 engine develops 60 bhp at 46,000 rpm, and is a lightweight portable unit suitable for driving a pump or for other industrial purposes. Production at present is limited, but it is expected that by the middle of next year output will be 40 per week.

Weight of the engine is 116 lb. Dimensions are: 23¼ in. high; 18½ in. wide; and 19 in. long. It reportedly will deliver 500 Imp gal of water a minute at 100 psi.

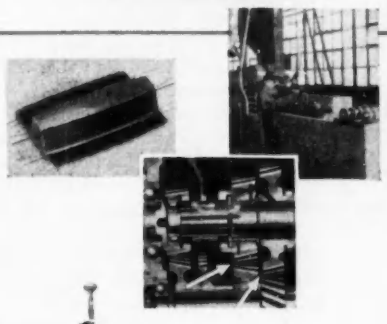
(*Turn to page* 134, *please*)

Why more and more truck manufacturers are shifting to FULLER



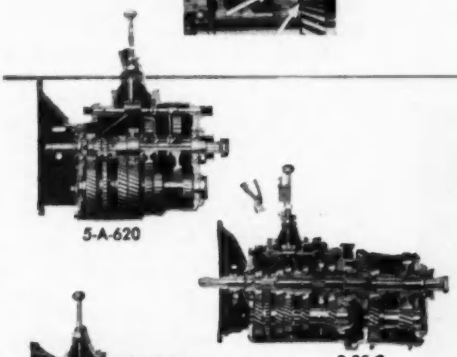
Demand from the field

Ask the driver—the man who has to maintain engine rpm to meet round-trip schedules. Ask the mechanic—the man who has to keep the truck *on the road.* Ask the owner—the man who has to pay the bill if the transmissions fail. They'll tell you they want a Fuller Transmission . . . *for Fuller has the features for more profitable trucking.*



Fuller design features

Open up a Fuller Transmission . . . and you can see the "extras" Fuller provides. Take a Fuller-equipped truck out on the road and *feel* it perform. Constant mesh, helical gears mean easier, faster shifting in forward speeds. Crowning the gear teeth prevents stress . . . longer life for Fullers. Shot peening reduces metal fatigue . . . less material failure.



110 Models—100 to 400 hp

Specify a Fuller Transmission for your on- or off-highway units and get a transmission *matched* to your load and road conditions . . . that will provide the right ratios for your job. Specify a transmission *designed to deliver* more effective horsepower . . . a Fuller Transmission.

where horsepower really goes to work

Fuller TRANSMISSIONS®

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO, MICHIGAN

Unit Drop Forge Div., Milwaukee 1, Wis. • Shuler Axle Co., Louisville, Ky. (Subsidiary) • Western Dist. Branch (Sales & Service, All Products), 641 E. 10th St., Oakland 6, Cal.

Industry News

(*Continued from page* 132)

Chicago Hudson Outlets Sue Fellow Dealer

The outcome of a multi-million dollar damage suit filed by 15 Chicago Hudson dealers against a fellow dealer could be significant. Plaintiffs charge Courtesy Motor Sales, Inc., and Jim Moran, its president, with violating Robinson-Patman and Sherman anti-trust laws on quantity discounts and advertising allowances from Hudson Motor Car Co. Significantly, neither Hudson nor its parent, American Motors, Inc., are named as defendants.

The dealers charge Courtesy Motors induced discounts of $72 to $90 from Hudson on a basis not available to other dealers. Also, they say Courtesy was exempted from the $30 per car joint advertising charge which other dealers pay.

Plaintiffs contend Courtesy Motors and Hudson conspired to restrain trade and monopolize trade and commerce in the Chicago area, thus preventing other dealers from competing and resulting in losses on new and used car sales, service, parts, insurance, and financing. Damages asked total $6.651 million.

Moran has branded the charges "completely false." He says his firm pays the same price for its cars as other dealers, and pays the same advertising charges.

New Extinguishing System Marks Navy Fire Truck

The Navy recently demonstrated a new aircraft crash fire and rescue truck now in quantity production by Biederman Motors Corp. Main features of the new truck are said to be its superior speed and mobility, a greatly improved fire extinguishing system, and simplicity of design and operation.

The truck is powered by a 320-hp, six-cyl, Continental gasoline engine which drives the loaded 17-ton vehicle at a top speed of 64 mph. It is claimed that from a standing start the vehicle can accelerate to 45 mph in 33 sec. and can cover the first mile in 83 sec.

The fire fighting system utilizes a new principle of foam-making whereby the necessary ingredients (air, water and foam concentrate) are whipped together in eggbeater fashion in specially designed pumps. The resulting mixture is forced out through two distributing nozzles on the roof of the truck. A separate 112-hp, Chrysler V-8 engine drives each of the two pumps so that the truck has two independent foam systems.

All engines, valves, hoselines, and liquid tanks are located inside the single van type body. The truck is 28 ft long, eight ft wide, and 11 ft high.

Wing Air Flow Control System Is Developed for Use by Jets

Navy jet planes should be able to increase their capacity to carry rockets or bombs by 3000 lb when a newly-perfected system for controlling the flow of air over the wings has been installed. Designed by the Bureau of Aeronautics, it is the product of more than three years of work.

The system bleeds air from the jet engine through holes in the duct and forces it out at high speed over the trailing edge of the wing. This action tends to reduce turbulence in that area by making the normal flow of air hug the wing skin when the plane is at slow or near-stalling speeds.

(*Turn to page* 138, *please*)

*REO DESIGN ENGINEERS SAID...

TOUGH JOB?

WE'LL SPECIFY

STRESSPROOF®

SEVERELY COLD-WORKED, FURNACE-TREATED STEEL BARS

AGAIN!

*Reo Motors, Lansing, Mich., have again specified STRESSPROOF —this time for the power shaft on their new rotary lawn mower.

Another
Reo Lawn Mower
to Use STRESSPROOF

Reo engineers needed *top performance* from this new drive shaft . . . so they insisted on STRESSPROOF! They knew from years of successful experience with STRESSPROOF that it could take abuse. It had both the strength and wearability to stand up under the toughest service—and its excellent machinability was most welcome from a cost standpoint.

The alternative to STRESSPROOF would have been a heat-treated part, with the attendant cleaning, straightening, and machining problems.

Only STRESSPROOF gives you a unique combination of four qualities *in-the-bar*: Strength, Wearability, Machinability, and Minimum Warpage. Yet it costs less than the other quality cold-finished steel bars.

STRESSPROOF makes a better part at lower cost! It is available in cold-drawn or ground and polished finish.

SEND FOR . . .
Free Engineering Bulletin, "New Economies in the Use of Steel Bars"

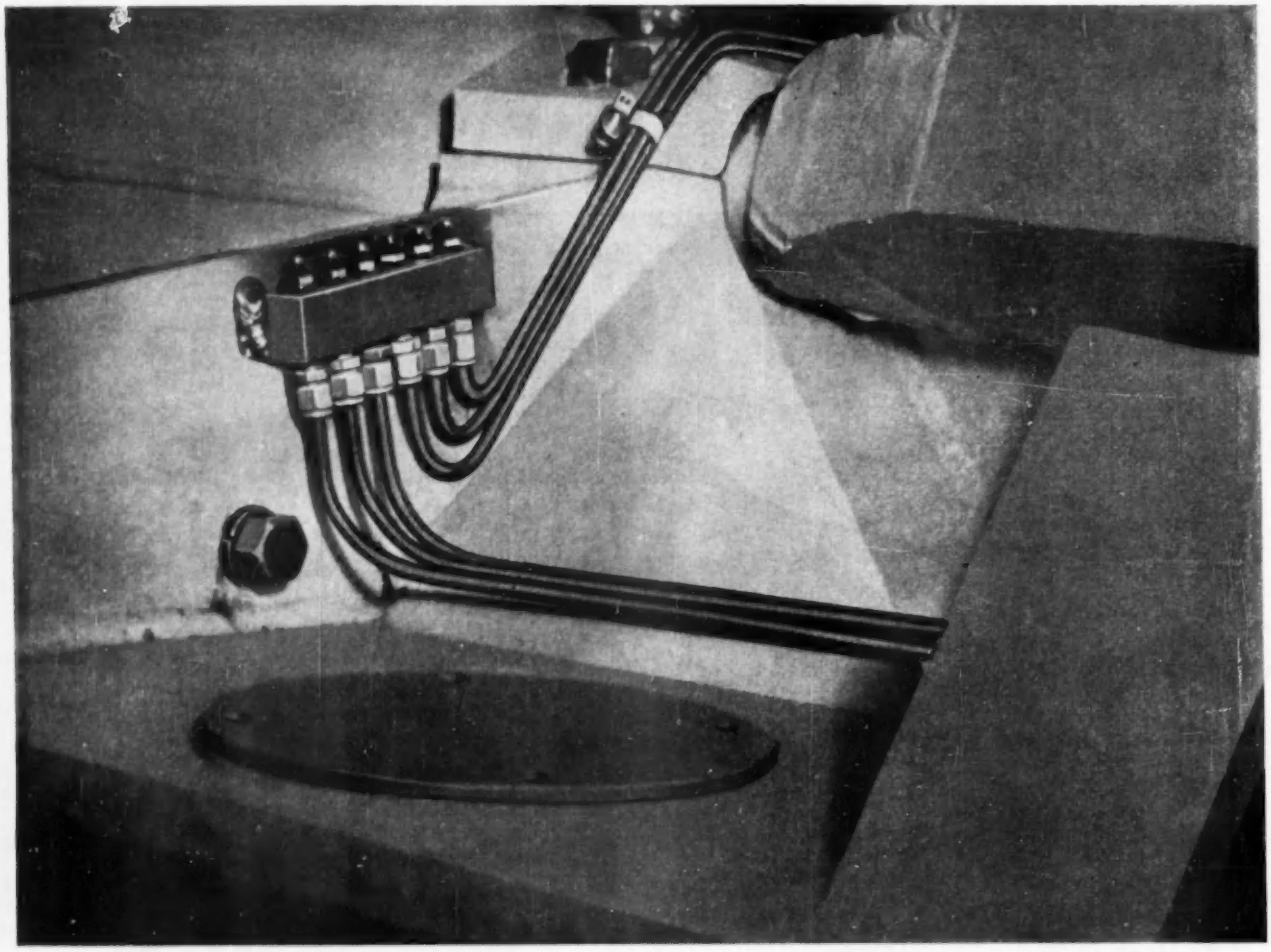
La Salle STEEL CO.

Manufacturers of the Most Complete Line of Carbon and Alloy Cold-Finished and Ground and Polished Steel Bars in America.

La Salle Steel Co.
1438 150th Street
Hammond, Indiana

Please send me your STRESSPROOF Bulletin.

Name_____
Title_____
Company_____
Address_____
City_____ Zone___ State_____



Bundy-fabricated ball-and-socket lubrication lines of leakproof Bundyweld help keep C Tournapulls on the job – all the time.

Bundyweld helps powerful earthmover deliver more yardage

WHY BUNDYWELD IS BETTER TUBING

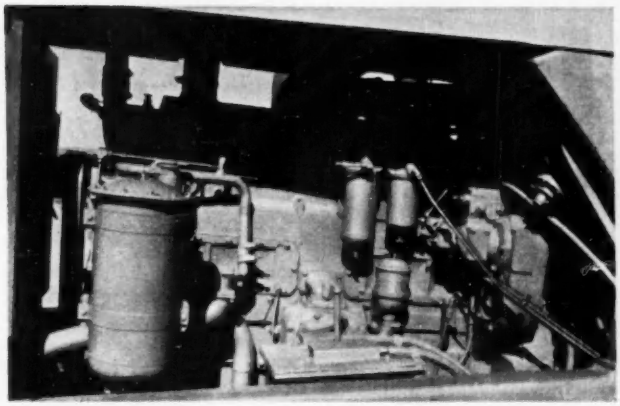
Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

← NOTE the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.



Fuel system in this powerful earthmover must be leakproof; the manufacturer uses fuel lines of Bundyweld.

New C Tournapull is a rugged, 16-yard-capacity, 19-ton-load unit with fingertip electric control.

Dependable Bundyweld functions faithfully as LeTourneau-Westinghouse earthmover hauls through sand, snow, mud without stalling

Whenever tons of earth must be moved efficiently, economically – through all kinds of adverse weather and surface conditions – the LeTourneau-Westinghouse Company's C Tournapull prime mover and scraper is on the job.

Advanced design and engineering features contribute largely to the C Tournapull's impressive record in the earthmoving field. Naturally, the manufacturers insist on a top-notch, always-dependable tubing for this top-notch, always-dependable machine. *That's why they specify Bundyweld.*

The rugged C Tournapull calls for many tubing applications, including fuel lines, lubrication lines, transmission lines. These lines must be absolutely leakproof; stand up under punishing vibration and heavy wear; have high tensile strength, high fatigue limit. *That's why they're made of famed Bundyweld Tubing.*

And LeTourneau-Westinghouse engineers and production people appreciate the fact that this quality tubing is shipped to them clean and bright, ready for use; that it's carefully inspected, carefully packaged, delivered *on schedule,* exactly as specified. *Just one more reason they vote for Bundyweld.*

Of course, if your operation requires fabricated tubing parts, whether simple or complex, we're equipped to produce them quickly, economically, exactly to specifications. No matter what your tubing needs, it will pay you to talk over your application with a Bundy tubing specialist. Call, write, or wire Bundy Tubing Company, the world's largest producer of small-diameter tubing.

BUNDY TUBING COMPANY
DETROIT 14, MICHIGAN

BUNDYWELD TUBING®

DOUBLE-WALLED FROM A SINGLE STRIP

Bundy Tubing Distributors and Representatives: ***Bridgeport, Conn.:*** Korhumel Steel & Aluminum Co., 117 E. Washington St. • ***Cambridge 42, Mass.:*** Austin-Hastings Co., Inc., 226 Binney St. • ***Chattanooga 2, Tenn.:*** Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • ***Chicago 32, Ill.:*** Lapham-Hickey Co., 3333 W. 47th Place • ***Elizabeth, New Jersey:*** A. B. Murray Co., Inc., Post Office Box 476 • ***Los Angeles 58, Calif.:*** Tubesales, 5400 Alcoa Ave. • ***Philadelphia 3, Penn.:*** Rutan & Co., 1717 Sansom St. • ***San Francisco 10, Calif.:*** Pacific Metals Co., Ltd., 3100 19th St. • ***Seattle 4, Wash.:*** Eagle Metals Co., 4755 First Ave., South • ***Toronto 5, Ontario, Canada:*** Alloy Metal Sales, Ltd., 181 Fleet St. East.
Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.

Industry News

(*Continued from page* 134)

Dummies Aid Chevrolet In Engineering Plans

Chevrolet has devised a dummy structure that serves as a type of three-dimensional blueprint in planning the dynamometer rooms of its new Engineering Center. The model is equipped with a full-scale mockup of a dynamometer and supplemental equipment. It was erected in a warehouse on the site of the Center.

In addition to the wooden dynamometer, the installation contains a dummy control panel, an engine and apparatus required in the measurement of automobile engine performance. The mockup will be maintained intact until all dynamometer rooms in the Center have been completed.

Feinsinger To Umpire GM-UAW Labor Disputes

Nathan P. Feinsinger, professor of law at the University of Wisconsin, has been appointed impartial umpire for General Motors Corp. and the UAW-CIO. He succeeds Gabriel N. Alexander, who has resigned the post after six years.

Mr. Feinsinger has served on many state and Federal boards connected with arbitration of labor-management disputes. He has held such posts as special assistant to the attorney-general of Wisconsin, general counsel of the Wisconsin Labor Relations Board, and at one time was a member of the National War Labor Board. He also has served on a number of Presidential fact-finding boards.

1916 Dodge Is Given To American Legion

A 1916 Dodge car, reportedly used by Gen. John J. Pershing during the Mexican Expedition, was presented June 4 to the American Legion by William C. Newberg, president of Dodge Div. The ancient, but serviceable car, also became the first combat vehicle used by the U. S. Army during a "motorized charge" against a group of Mexican bandits in 1916 by the then Lt. George S. Patton, Jr., when cavalry proved unsuccessful.

The ancient car will be used by the American Legion at its conventions throughout the country this year and later will be displayed at the Chrysler Salon in New York.

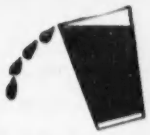
(*Turn to page* 140, *please*)

A Glass of Water Explains How Holley Engineers Took the Stalling Out of Sudden Stops

The simple thing you've seen a hundred times—a full glass of water spilling over the sides when carried —explains the reason for a common driving annoyance. Abrupt stops and fast starts frequently cause engines to miss or stall. The reason: the same spilling action in a glass of water occurs in ordinary carburetors with off-set fuel bowls. Abrupt stops and starts pull gasoline away from fuel intakes, starving the engine, or spill quantities of gas into the manifold, flooding the engine.

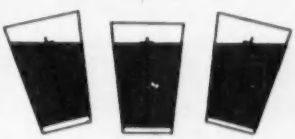
Holley, working closely with automotive engineers, designed the first concentric type carburetor. Again, the basic theory comes from a glass of water. The depth of the water over the center of the bottom of the glass will remain the same even when the glass is tilted at extreme angles. Thus, by locating all fuel intakes at the center line of the fuel bowl, the engine is always assured of the proper amount of gasoline during fast stops, fast starts, on sharp turns, or when starting on a steep grade. Similarly, the location of the fuel intakes close to the venturi in the Holley off-set bowl carburetor has reduced this driving annoyance on volume cars.

Holley's proven experience in designing increasingly efficient carburetors to meet the requirements of modern engines has produced a record of "firsts" unmatched in the industry. So—if you're wondering how to do a job of fuel metering better and more efficiently, call Holley's Carburetor Engineers. Let them listen, test, recommend and design.



A glass of water explains engine stalling during quick stops and difficult starting when parked on angles. When tipped or carried, water spills over the edge of the glass.

Much the same action takes place in the fuel bowl of a standard carburetor. An abrupt stop or start changes the fuel level forcing gasoline into the manifold, flooding the engine, or—pulls gasoline away from fuel intakes, starving the engine.



The solution to the problem is also graphically explained by the water glass. The depth of the water over the center of the bottom remains the same, no matter which way the glass is tilted.

By locating fuel intakes at the center line of the carburetor fuel bowl, the engine is always assured of the proper amount of gasoline for smooth, efficient performance. This is called true concentric carburetion. Holley Centri•Flo and Centri•Quad carburetors are true concentric design.

HOLLEY
Carburetor Co.
VAN DYKE, MICHIGAN

WORKING WITH AUTOMOTIVE ENGINEERS TO INCREASE STANDARDS OF PERFORMANCE AND ECONOMY FOR MORE THAN HALF A CENTURY

Industry News

(*Continued from page* 138)

Ford Starts Construction Of Waste Disposal Plant

Ford Motor Co. has started construction of an industrial waste treatment plant for removing impurities from liquid waste formed during steelmaking operations at the Rouge plant. Built at a cost of nearly $1 million, the plant will have capacity to separate oil and solids from a flow of 80 million gal a day.

All waste from the steel mill sewers will enter "grit chambers" in the plant. Solid particles will be extracted and the liquid pumped to clarification tanks, which serve as settling basins for the waste water. A rotating arm on the bottom of the tank will force the settled solids into "sludge lagoons," from which it will be hauled away.

Another rotating arm will skim off the oil which rises to the top of the tanks. It will then be directed to salvage storage tanks for later repurification.

Air-to-Air Guided Missile Being Produced for Navy

Sperry Farragut Corp. is now producing and making deliveries of a new air-to-air guided missile called the Sparrow. It is intended for use by Navy combat planes.

Developed by the Navy Bureau of Aeronautics and Sperry Gyroscope Co., the missile is rocket-powered and fully maneuverable at supersonic speeds. Light and compact, it can be carried in multiple units by fighter aircraft.

No data have been revealed on performance characteristics or the guidance system of the Sparrow. The Navy put more than 100 prototype models of the missile through flight tests before selecting the production type.

New Purchasing Directory Is Offered by Government

A 92-page directory titled "Who in the Federal Government, biggest buyer in the world, buys what, and where" is being offered by the Small Business Administration through the Superintendent of Documents, Washington, D. C. Selling at 50 cents, the publication lists more than five million items the U. S. buys for its military and civilian agencies.

Bell Aircraft Develops Remote Control System

Bell Aircraft Corp. has announced development of an electronic remote control system. It reportedly can land pilotless guided missiles just as piloted airplanes are landed.

The electronic unit reportedly not only lands missiles, but launches them, flies them and puts them through flight-test routines as well. When the missile is to be landed electronically and recovered, it is equipped with a tricycle landing gear. Bell states that the same remote-control system could also be used in testing experimental airplanes.

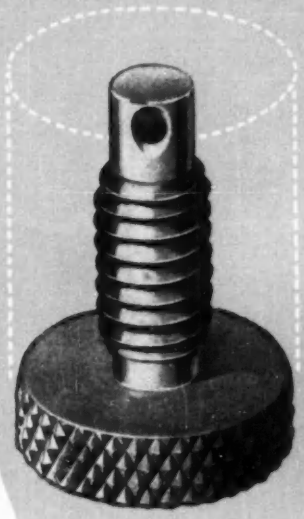
Two New Movies Offered by GM

Two new movies have been produced by General Motors Corp. for public use. They are "ABC of Jet Propulsion," the fourth in a series of films explaining how jet engines, turbines and rockets operate, and "Passing Fancy," produced particularly for women, which deals with highway safety.

(*Turn to page* 144, *please*)

CAMCAR COLD-FLOW

WATCHES THE WASTELINE

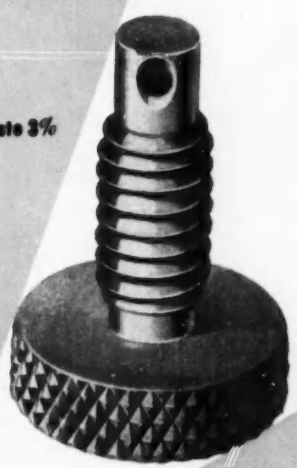


Old Method
Metal Waste 75.3%

Camcar Cold-Flow reduces metal *waste* to only 3% in the production of this part . . . a 75% savings over the old method. Cold-Flow keeps the waste in line . . . saves material . . . *forms* parts by metal flow . . . in contrast to older methods that *cut* parts from large diameter stock.

Cold-Flow works on a strict diet — in high and low carbon steels, copper, brass, aluminum, stainless and many others — creates intricate shapes to meet exacting assemblies . . . and in high volume.

The Cold-Flow principle of high speed metal flow increases part strength, lengthens life . . . for the metal grain smoothly follows the part contour. And Cold-Flow compresses outer fibres to achieve greater surface hardness . . . more wear resistance.

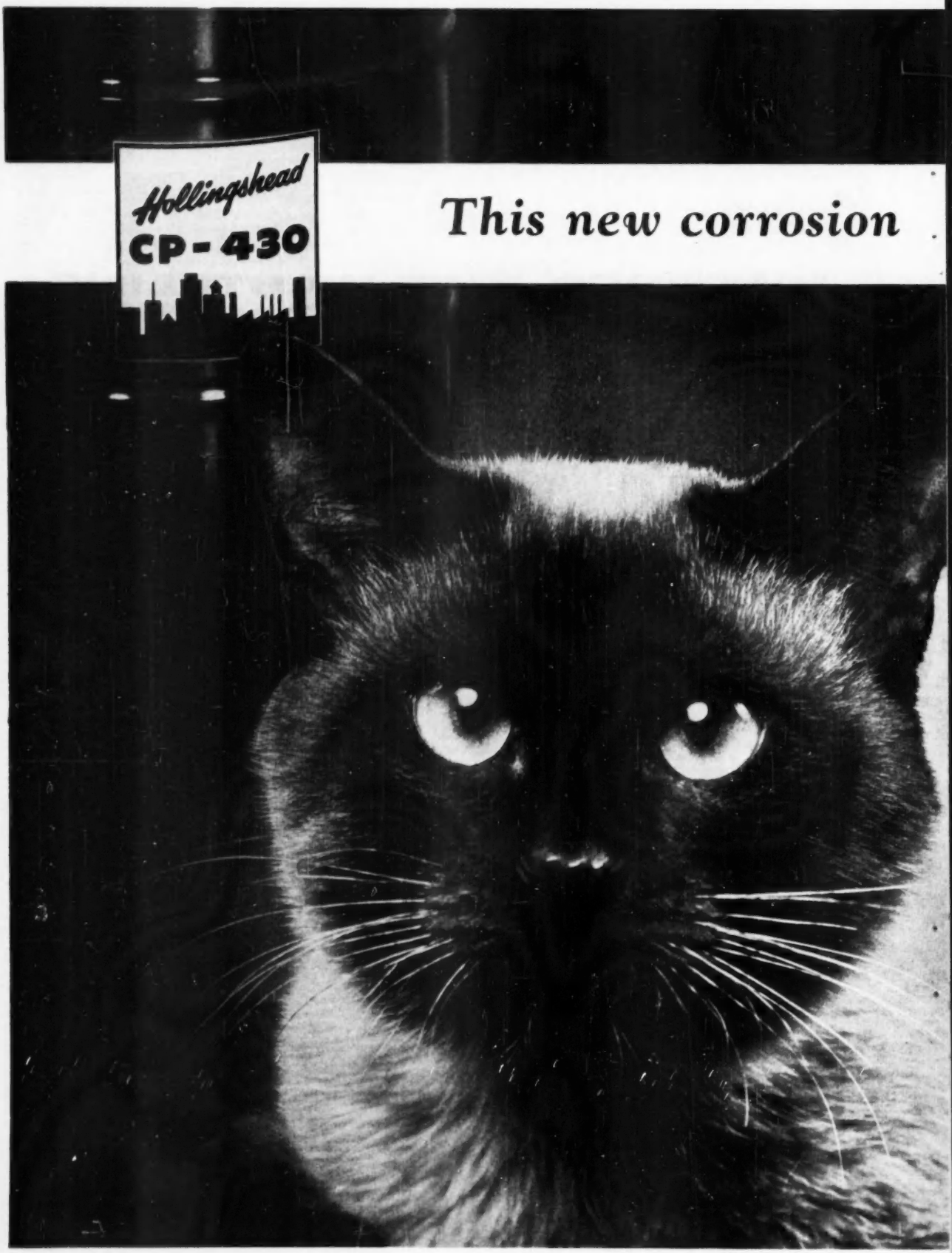


Cold-Flow
Metal Waste 3%

Send us requirements, specs and samples. Or ask for a field specialist.

CAMCAR COLD-FLOW

CAMCAR SCREW & MFG. CORP.
ROCKFORD, ILLINOIS
Telephone: 5-9451 • Teletype: RK-8653


Hollingshead
CP-430
This new corrosion

preventive leads many lives!

You can pour more jobs from a drum of CP-430 than first meets the eye. This new corrosion preventive by Hollingshead is a "one-barrel", all-purpose corrosion preventive for all anti-rust applications from first rough metal removal to final preservation including surface finishing and inspection.

Significant economies and conveniences can be realized by purchasing CP-430 Concentrate: easy control of inventory, cheap storage, lower shipping cost, high protection control and a "one-barrel" protection program . . . all of which add up to important savings in materials and handling.

CP-430 performs 9 important in-shop functions

1. As an ECONOMICAL SLUSHING COMPOUND when diluted with as many as 10 parts petroleum solvent.

2. As a NON-INFLAMMABLE RUST PREVENTIVE when diluted with two parts water.

3. As a COOLANT REMOVER after cutting and grinding when diluted with petroleum solvent.

4. As a LONG TERM INDOOR STORAGE COMPOUND when used as a concentrate.

5. As a WATER DISPLACING COMPOUND after alkali washing when diluted with petroleum solvent.

6. As a FINGERPRINT NEUTRALIZER when diluted with petroleum solvent or water.

7. As a complete FINGERPRINT REMOVER when diluted with petroleum solvent and water.

8. As a PACKAGING PRESERVATIVE when used in concentrated form.

9. As the base for your own PRESCRIPTION CORROSION PREVENTION.

Hollingshead also supplies other Corrosion Preventives for slushing, fingerprint removal and short and long-term protection.

R. M. Hollingshead CORPORATION

Leader in Maintenance Chemicals

840 Cooper Street
Camden 2, New Jersey

102 Eglinton Avenue East
Toronto 12, Ontario

Industry News

(*Continued from page* 140)

Pension Benefits Boosted at Ford

Revisions in the general retirement plan, which will give salaried employes about a 33 per cent increase in benefits without extra cost, have been put into effect at Ford.

The non-contributory program now provides a maximum monthly pension of $137.50, which includes social security. Under the contributory plan, eligible salaried employes may put five per cent of their base salary in excess of $300 into the retirement fund. The new benefits are retroactive to Jan. 1 and apply to employes already in retirement.

Under the new setup, an employe with an average base salary of $600 a month, who contributes to the program for 30 years, will receive $180 a month in comparison to $135 under the old plan. With the addition of non-contributory benefits, the combined pension benefits would amount to $317.50 a month.

Suit Settled Against Ward in Battery Case

A four-year-old antitrust suit against Montgomery Ward & Co., the Association of American Battery Manufacturers, and several other firms charged with price fixing has been settled by the Justice Dept. Montgomery Ward was fined $500, and a consent judgment, ending a civil suit, was agreed upon.

Under the consent judgment, the defendants are prohibited from fixing prices on used batteries and salvaged lead and preventing competition between new and used batteries. However, another suit against the Association of American Battery Manufacturers and a battery firm is still pending.

Automobile Dealers Spent $221 Million For Ads

The National Automobile Dealers Association reports that new car dealers spent in the neighborhood of $221 million for local advertising in 1953. Statistics compiled by NADA for the first time showed the average outlay amounted to $38.06 per new car sold. The total expenditure included ads placed in local newspapers, on radio and television and for handbills and signs.

(*Turn to page* 147, *please*)

A wheel's work is never done

Rolling or at rest . . . wheels have to take all kinds of stresses and strains, both expected and unexpected, under a bewildering variety of brutal hauling and loading conditions.

Analyzing these stresses and strains . . . and engineering wheels to withstand them with an extra margin of safety has been the business of Kelsey-Hayes for more than 45 years. That's why manufacturers who keep American industry and the American people *on the go* look to Kelsey-Hayes for leadership in wheels. Kelsey-Hayes Wheel Company, Detroit 32, Michigan.

KELSEY HAYES

World's Largest Producer of Automotive Wheels

Wheels, Brakes, Hubs, Brake Drums, Special Parts for all Industry • 9 Plants—Detroit and Jackson, Mich. . . . McKeesport, Pa. . . . Los Angeles . . . Windsor, Ont., Canada . . . Davenport, Ia. (French & Hecht Farm Implement and Wheel Div).

New Jobs for One of the World's Most Useful Metals:

STRAITS TIN from MALAYA

Concentrating tin ore in Selangor, Malaya. Malayan economy depends heavily on tin exports. Thus a continuing and stable market for tin is as vital to Malaya as a continuing and stable supply is to the United States.

New Tin Alloys---New Techniques Make Soldering Faster, More Efficient

They've been using tin-rich solders for almost 2000 years — and haven't found a real substitute yet! Nothing else is as cheap or easy to use in making corrosion-resistant, impermeable, electrically conductive joints at relatively low temperatures.

Making Solder Still More Efficient

Now, new alloys and new soldering techniques are making tin solders still more useful on production lines.

A solder of tin-indium, for example, is now used for sealing glass to metal or glass to glass—will adhere to mica, quartz, thermosetting plastics, and some glazed ceramics, as well.

For joining aluminum, cerium added to a tin-rich, tin-zinc solder gives both improved salt spray resistance and better wettability.

New techniques for applying solder include ultrasonic methods of soldering and tinning aluminum, and the new mechanized dip soldering process that is saving industry thousands of man-hours.

Tin is, of course, the key ingredient in solder. Over one-third of the world's tin is mined and smelted in Malaya. Known as Straits Tin, this metal is more than 99.87% pure and is world-famous for its absolute reliability of grade.

A New Look at Straits Tin

Today, not only new solders but new tin alloys, new tin-alloy coatings and platings, and new uses for tin chemicals have been discovered that make Straits Tin more valuable than ever to American industry. And continuing research will find still more ways in which tin can serve you in the near future.

Whatever your product or process may be, now is the time to reappraise carefully the unique combination of properties of Straits Tin. For no other metal we know today can do so many different kinds of jobs so economically and so well.

MALAYAN TIN BUREAU

A new booklet, "Straits Tin: A Most Useful Metal for American Industry," tells a factual and intriguing story of the many new ways tin can be used today. A copy is yours for the asking.

THE MALAYAN TIN BUREAU

Dept. 406, 1028 Connecticut Ave., Washington 6, D.C.

Industry News

(*Continued from page* 144)

Ford Workers Simplify Engineers' Language

The technical language used by the engineers who create cars is being simplified by the people who put them together. At Ford plants production workers are inventing their own slang terms to identify parts which have complicated names.

For example, a "duct assembly (ventilator air), right side, part No. BM7001902A," a tube which brings fresh air to the heater, is a "stovepipe" in the production worker's jargon. The distinctive curve in the body at the bottom of the rear door is called "dog leg."

Some of the many other terms simplified and popularized by the production workers are: the U-shaped stamping which supports the radiator is known as "horse-collar"; the grooved chrome trim installed on the Victoria and Skyliner, "railroad tracks"; the chrome trim attached diagonally to the rear door or quarter panel, "sergeant's stripes"; and the grill center section, "Dagmar."

U. S. Settles Suit Against Parts Group

A four-year-old antitrust suit against the National Automotive Parts Association and 23 of its member firms challenging various sales and distribution methods has been settled in the Federal Court in Detroit. Under a consent judgment, the firms are prohibited from entering into any agreement on price fixing, discounts or buying parts from one manufacturer, and allocating or dividing territories, markets, or customers for distribution of products.

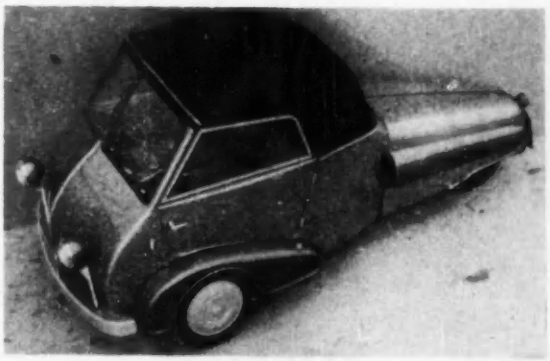
Springs Get Rough Beating In Ford Durability Tests

Car and truck springs are undergoing punishment by Ford Motor Co. under conditions not ordinarily encountered on the road. A coil spring, for example, is depressed 400,000 times by a machine which bounces it continuously for a week with a force equal to the weight of two cars.

Leaf springs are flexed 150,000 times and then placed in special twisting devices. Valve springs are operated at a simulated engine speed of 80 mph for 6000 miles. During this period they are depressed about 10 million times.

THREE-WHEELER

Drive to the single rear wheel of this three-wheeled convertible is from a nine-hp, two-stroke engine through a four-speed gearbox. Independent suspension and hydraulic brakes are on all wheels. Made by Ing. Fraenkel & Kirchner of Austria, the car is 100 in. long and weighs 420 lb.



News of the MACHINERY INDUSTRIES

(*Continued from page 63*)

to terminate the agreement at the end of one, two or three years depends on the plan selected. The lease may also be written with the option to purchase at the end of any one of these same years. This plan is designed to cover standard machines, plus the required electrical equipment. Certain accessories and all tooling must be purchased outright. Special purpose machines can be leased by special arrangements.

Automation—A New Role

The use of advanced electronic art to control manufacturing processes and to solve business problems is probably the century's greatest contribution to the reduction of man's burden, Dr. M. J. Kelly, president of Bell Telephone Laboratories, declared.

Speaking at the 62nd general meeting of the American Iron and Steel Institute in New York, where he delivered the annual Schwab Memorial Lecture, Dr. Kelly said that "automation through electronic digital systems will relieve man from the more routine and repetitive mental operations of the civilian economy." Clerical operations such as accounting, payroll, stock-keeping, production control, sales analyses, and market forecasts, are areas where electronic automation will supply business with a new tool of large economic significance.

Gears Going Up

According to the American Gear Manufacturers Association, the volume for the gearing industry increased by 23 per cent in April as compared with March. Based on 1947-49 = 100, the April index is 158.2.

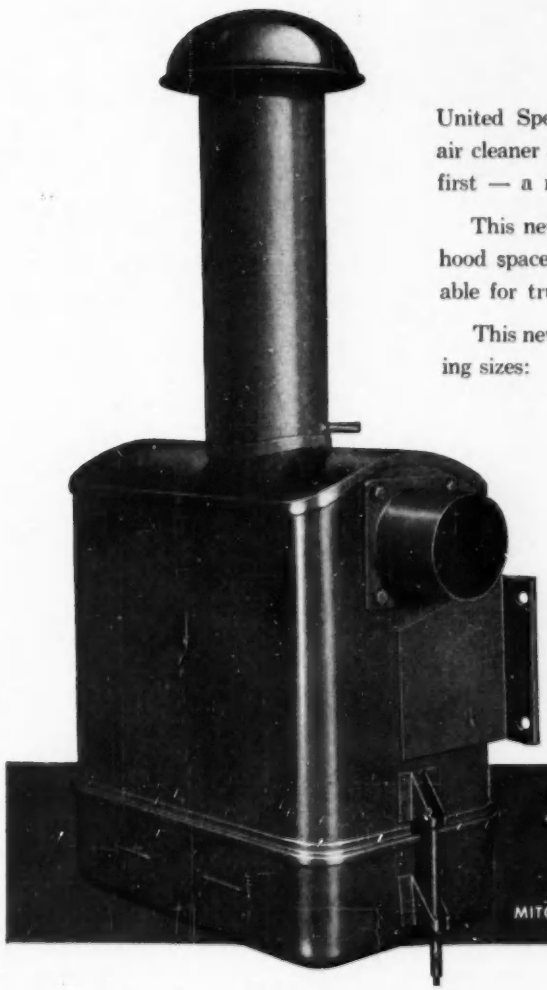
Around the Industry

The Bullard Co. reports first quarter net income for 1954 to be $2.3 million—almost a three-fold increase over the last quarter of 1953. Unfilled orders at the end of March amounted to $2.6 million.

Jones & Lamson Machine Co., in its 1953 annual report, shows a net income of $1.6 million for the year. This is a slight increase over the

United Specialties presents

a New Rectangular Diesel Air Cleaner...



United Specialties Company, originator of many new, important air cleaner designs, now announces another significant air cleaner first — a rectangular oil bath air cleaner for diesel engines.

This new design was created to better utilize limited under-the-hood space — provide more space for other accessories. It is available for truck and tractor engines, and for industrial power units.

This new rectangular oil bath air cleaner is available in the following sizes:

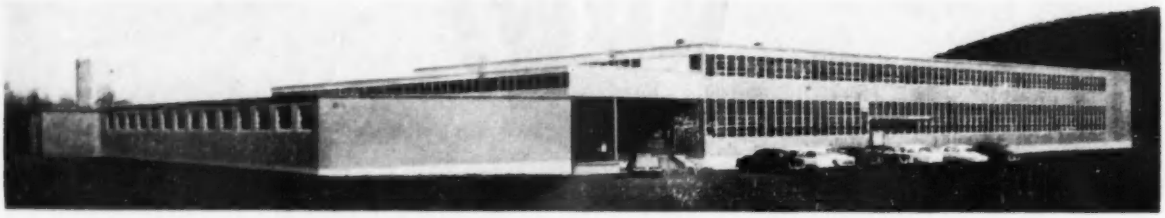
5¾ x 9½ for an air capacity of 175 cfm
6½ x 11 for an air capacity of 240 cfm
7½ x 12¼ for an air capacity of 300 cfm
8¾ x 14 for an air capacity of 400 cfm
10 x 16 for an air capacity of 525 cfm
11½ x 19½ for an air capacity of 740 cfm

Our sales engineers will be happy to give you full details on the new rectangular diesel air cleaner. Write for complete details.

UNITED SPECIALTIES COMPANY

UNITED AIR CLEANER DIVISION — CHICAGO 28, ILL.
MITCHELL DIVISION — PHILADELPHIA 36, PA. • BIRMINGHAM 11, ALABAMA

Air Cleaners • Metal Stampings • Rolled Shapes • Ignition Switches • Turn Signal Switches • Dovetails



The new assembly plant of Hartford Special Machinery Co. was recently opened on the outskirts of Simsbury, Conn. It is believed that within the next five years the main Hartford plant will be located in this area.

1952 net income. Shipments during year of $29.7 million were the second highest in company history.

Hartford Spreads Out

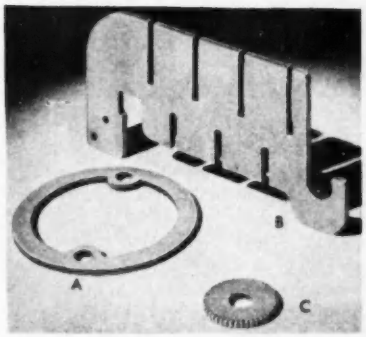
The Hartford Special Machinery Co., Hartford, Conn., has built an ultra-modern 44,000 sq ft plant in Simsbury, Conn. According to Robert P. Merritt, president, this is the first step in a plan which will ultimately move the company's entire operation to Simsbury. For the present, Hartford Special's new building will be used as an assembly plant. The fabrication of parts and the main offices will continue at the present Hartford location. The expansion out of the city was undertaken both as a plan of "industrial decentralization" and as a necessity in order to house its growing business.

Replacement Demand for Equipment Rising

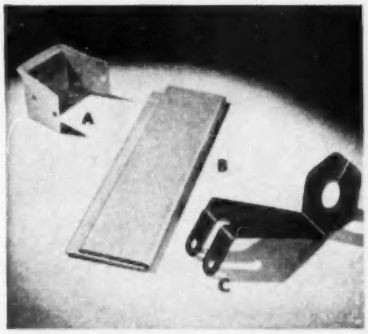
Computed replacement requirements for capital equipment will rise from an estimated $10.4 billion in 1954 to $15 billion in 1960, and in 1975 will be at the $26.7 billion level.

Factors supporting this projected trend of replacement demand are presented in a study by the Machinery and Allied Products Institute on changes in the age composition of the nation's stock of business capital goods. This study, one in a series examining the long-range outlook for capital goods production, is presented in the May issue of the *Capital Goods Review*.

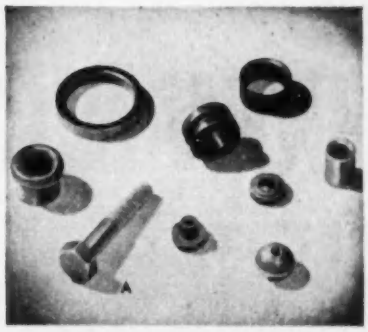
Institute study indicates that 80 per cent of equipment retirements occur in the over 10-year age bracket. The stock of capital equipment has an historic growth rate of about three per cent per annum compounded. If this rate continues, the stock of capital equipment over 10 years of age will rise from $60 billion currently to $100 billion in 1960 and almost $200 billion in 1975, more than three times the present amount.



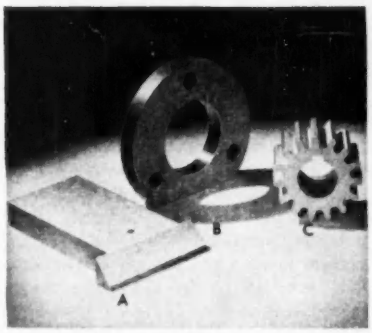
A. Sheet stock, shear strips, punch. B. Sheet stock, shear, punch blank, gang saw notches. C. Sheet stock, shear strips, punch blank, mill notches.



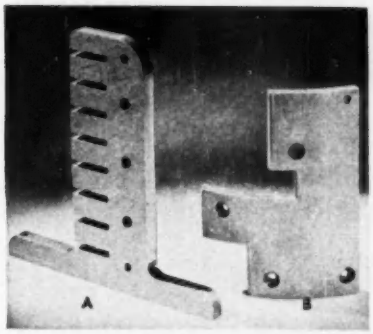
A. Sheet stock, shear strips, punch, form. B. Sheet stock, shear to size, drill, form. C. Sheet stock, shear strips, punch pieces, form in mold twice, rubber stamp twice.



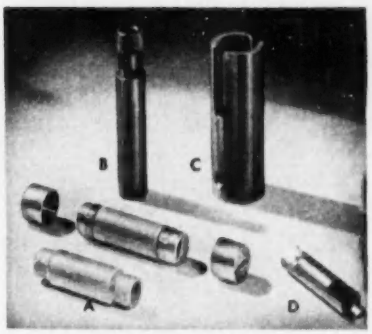
A. Rod (hexagonal), smooth saw, automatic screw machine, turn shoulder thread, champfer and cut off. Remainder are automatic screw machine parts made from Diamond Fibre by C-D-F.



A. Sheet stock, sand, smooth saw to size, smooth saw bevel, smooth saw corner cut out, drill. B. Sheet stock, band saw, turn OD, bore ID, smooth saw side, drill five blind holes with jig. C. Sheet stock, sand, band saw, rough bore ID, hob teeth, finish bore ID, machine keyway.



A. Sheet stock, sand, smooth saw, drill, smooth saw to shape, radius three corners, gang saw notches. B. Sheet stock, band saw rough blanks, form, smooth saw width, length and shape, radius edges, drill with jig, countersink.



A. Tube, automatic screw machine, turn shoulders, champfer and thread end, thread other. B. Tube (long pieces), smooth saw, tap threads, screw machine, (small pieces) auto. screw machine, thread, knurl, champfer, cut off. C. Tube, smooth saw to length, punch twice, countersink. D. Tube, automatic screw machine, champfer, cut off, punch.

C-D-F fabricates and forms DIAMOND VULCANIZED FIBRE

FAST . . . AT LOW COST . . . DEPENDABLY

Vulcanized Fibre is a wonderful material if you know where to use it and how to buy it. We suggest on many jobs that it's best to do the fabrication and forming in C-D-F's shops. Why? Because C-D-F knows how. Since 1895 the company has put fibre to work in everything from buggy axle bushings to metal clad radio parts. The handling of thousands of set-ups for high speed, low cost production runs gives C-D-F an "experience bank" to draw from. Shop supervisors have a wealth of short cuts, little tricks that result in lower prices for you. They know the material and its peculiarities.

TOUGH, RESILIENT, STRONG

How long has it been since you examined the unique properties and wide range of C-D-F fibre grades? Vulcanized Fibre is arc resistant, mechanically strong, non-corroding, half the weight of aluminum. Repeated moistening and drying in forming insignificantly alters the nature, structure or quality of the fibre.

Since C-D-F has their own paper mill, uniform, quality control is made possible. Special grades are more easily developed. A good example is C-D-F Abrasive Fibre, a medium density fibre with excellent resin and grit adhesion, now widely used for abrasive discs.

A BIG, RELIABLE SOURCE

C-D-F does business with the largest tonnage users of sheet, rod and tube fibre in the world. This means good deliveries, good prices, reliable products for every new customer. You deal with a materials engineer, a C-D-F man who knows how to give you the most value in Diamond Vulcanized Fibre. If you want to improve design, simplify purchasing, speed production, use Diamond Fibre and the facilities of C-D-F. Write for catalog, free test samples, or send us your print for quotation.

CDF *Continental-Diamond Fibre*

CONTINENTAL-DIAMOND FIBRE COMPANY
NEWARK 2, DELAWARE

Trends in Powder Metal Applications

Powder metallurgy has deep roots in automotive equipment due mainly to the pioneering efforts of a number of well known specialists in this important field of activity. The uniquely porous nature of sintered compositions was exploited to the maximum extent, from the very beginning, in the manufacture of the so-called oilless type bearings and bushings. Such applications have persisted over the years and doubtless represent a substantial part of the business of many producers.

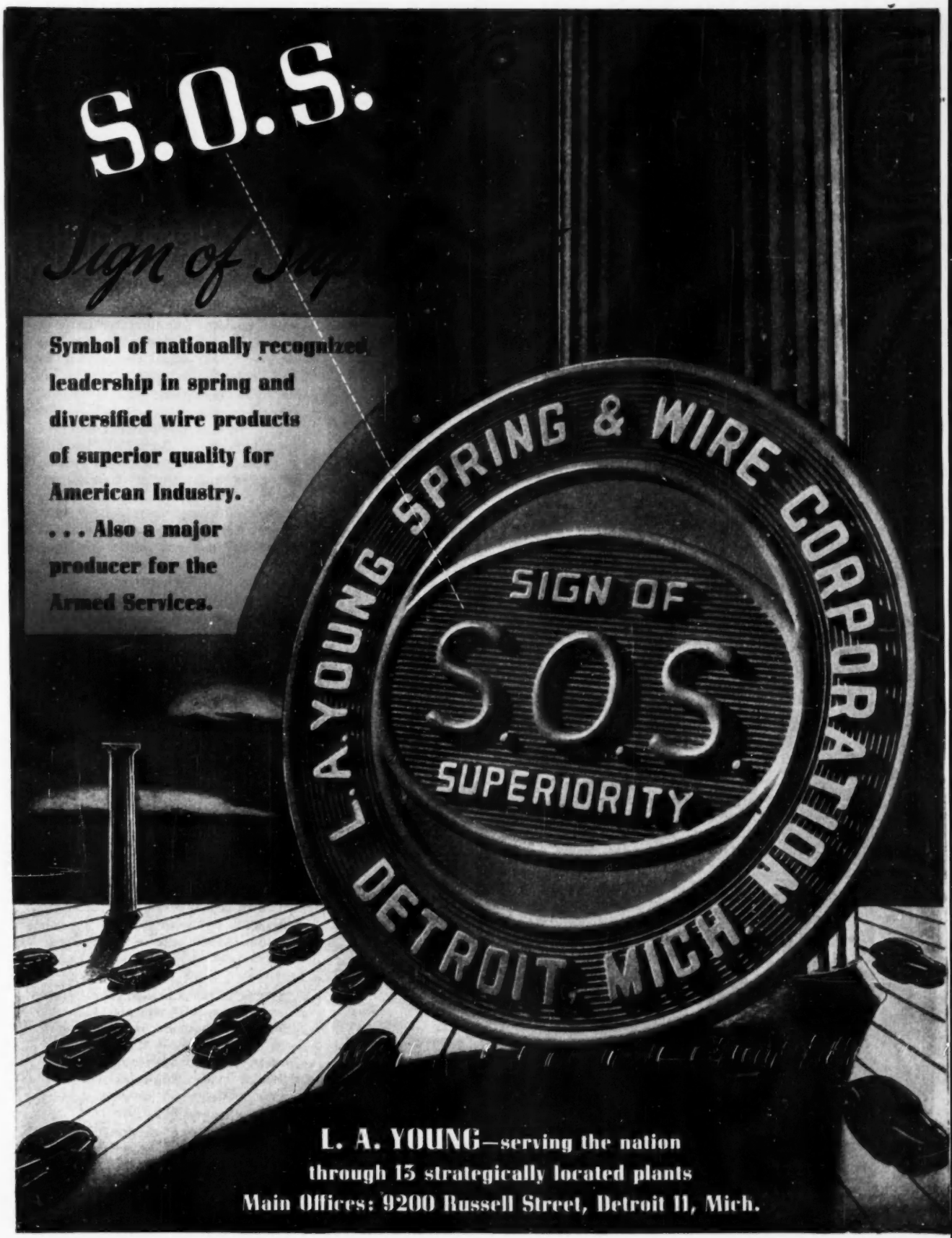
Although both non-ferrous and ferrous applications are constantly widening, the greatest potential for future expansion is in the field of the ferrous materials. Prior to WWII the usage of copper powders was about five times that of iron. Today the tonnage is about equally distributed, with iron powders making greater headway in certain respects.

In addition to the pioneering work that has been done in recent years in exploiting iron powders, steel compositions, stainless steel, etc., much of the credit must go to the many domestic companies who have developed facilities for making iron powders in the U. S. in sufficient tonnage to meet all requirements. No longer are we dependent upon foreign sources nor do we face the interruption to military and civilian needs in the event of a war economy.

It is important to emphasize the amazing advantages and consequently enormous potential for sintered parts —mainly of ferrous compositions—in replacing selected machined parts. This applies to the general class of parts such as gears, pump rotors, cams, levers, blocks, ratchets, etc. Even more important are the more intricate parts which eliminate tooling and metal cutting equipment, and eliminate numerous machining operations as well.

If the full potential of the metal powder industry is to be realized, it is necessary for all of its members—metal powder suppliers, producers of sintered parts, as well as the Metal Powder Association to initiate an aggressive program of educating the potential customers, particularly the design engineers and production people. Certainly the best approach would be by way of specific case studies, on related parts that have been established successfully.

Gears are a major potential field of application. Many years ago the only gear application that seemed a natu-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Symbol of nationally recognized leadership in spring and diversified wire products of superior quality for American Industry. . . . Also a major producer for the Armed Services.
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Main Offices: 9200 Russell Street, Detroit 11, Mich.

ral for automotive work was for the engine oil pump. Since then we have many varieties of special lobed and cam-shaped designs used in engine oil pumps, vanes and rotors for oil pumps for automatic transmissions, and more recently for hydraulic steering mechanism.

Friction materials comprise another important field. Among manufacturers of record active in this specialty are the following: S. K. Wellman, Moraine Products, Raybestos-Manhattan, General Metals Powder, Metallic Friction Materials, American Brakeblok Division, Bendix Products.

Since the end of the war the field offers many new materials not available before—zinc, aluminum, innumerable special mixtures, stainless steel, and carbon steel. Sintering permits of mixtures of metals that cannot be alloyed by melting or produced by casting. Designers should be told of the possibilities of making finished parts accurately to size and form from materials that could not be machined by normal methods or with any degree of economy. These are the most potent arguments for a longer look at metal powder.

Much is known now about the possibilities of producing parts possessing high tensile properties through the application of secondary heat treatment such as carbo-nitriding, for example. Very few outside the metal powder industry realize this.

Electroplating of metal powder parts is known to be successful, although it was considered impossible only a short time ago. Designers must become aware of this feature as well.

Recently an Amplex stainless steel Oilite composition was adopted in making the manifold heat control valve bushing for Chrysler Division V-8 engines. On this application, the sintered part offers the answer to high temperature and corrosion effects, not obtainable with conventional materials.

Still another development deserves special mention. Both Carboloy and P. R. Mallory are producing a unique, extremely high density material by metal powder techniques. Known as Carboloy Hevimet and Mallory 1000 respectively, the material is composed of 90 per cent tungsten, six per cent nickel, four per cent copper, has a density of 16.7 gm per cc.

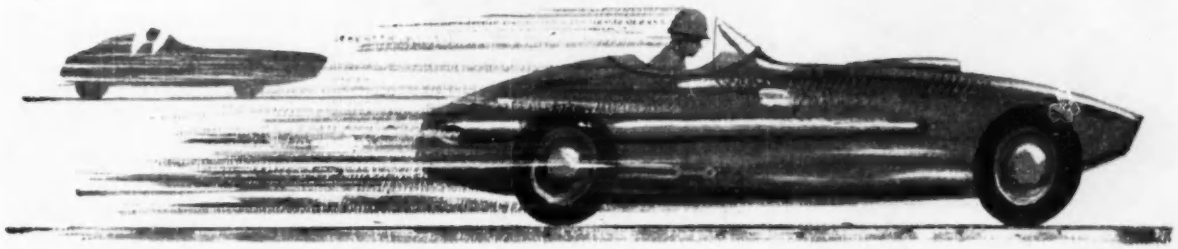
In addition to its exceptional density, the material has high tensile properties and excellent machinability. At present it has a number of unique applications in the aircraft field. One is for the rotating inertia element in a gyroscope used in navigational instruments, automatic pilots, bomb sights, etc. Because of its higher moment of inertia, it replaces more conventional materials, permits a reduction in the size of the rotor and gyroscope assembly.

Mallory 1000 also is used as a counterbalance where space is limited and where good design requires increased weight per unit volume. Accordingly, it has been used for aileron weights and in guided missile parts. Another application is for a counterweight for dynamically balancing a motor-driven radar antenna. Here it was possible to design a much smaller motor.

A report from Chrysler Corp. indicates that as of December, 1953, 197 different parts, made of various sintered metals, were being used in Chrysler Corp. passenger cars and in Dodge trucks. Many of these are built into assemblies supplied by 16 vendors who use Oilite products.

The above is an abstract of a paper presented by Joseph Geschelin, Detroit editor of AUTOMOTIVE INDUSTRIES, *at the Annual Meeting of the Metal Powder Association held recently in Chicago.*

FOR High Speed MACHINING



. . . YOU NEED ANTISEP

Like racing cars, metal cutting machinery and tools are built for higher speeds today than ever before. But to get all the metal cutting speed your equipment can give, you need a modern, high-speed coolant—Antisep A. P. Base!

Antisep is a heavy-duty, fortified cutting base—soluble in water—that has greater lubricity and carries away heat faster than any cutting fluid you can match against it. It has excellent anti-welding properties and is treated to eliminate rancidity and odor.

Take advantage of the profitable production speed of your machines by using Antisep. For a trial production run in your own shop, call your Houghton Man or write E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

MACHINING SPEED RAISED FROM ONE PART EVERY SIX MINUTES TO ONE PART EVERY 3.16 MINUTES!

An East Coast machine shop operator practically doubled the speed of his machining operations when he switched to Antisep. He got longer tool life and more satisfactory all-round performance, too.

ANTISEP

THE HEAVY-DUTY, WATER-SOLUBLE

CUTTING BASE

. . . a product of

E. F. HOUGHTON & CO.

PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . .

Indianapolis "500"

(*Continued from page* 48)

used in combination with rotary hydraulics. Such instances appeared to be the extremes; most cars combined one pair each, although numerous changes were made in mountings.

A couple of epidemics developed in the early phases of race preparations. One involved pistons and the other disclosed a rash of cracked crankshafts. These things always look bad at the time but generally yield to treatment.

As usual, the weather, played a strong part in pre-race preparations, this time with a climactic twist which resulted in phenomenal qualifying speeds on the final day. Early May weather was surly as in former years, but for the first time in the memory of this deponent since the war there were two pairs of well-nigh perfect qualifying days, separated by a week of fairly good conditions.

The result was a group of qualifiers which shattered all previous records for one and four laps. These were held by the late Chet Miller, who established them in 1952.

No fewer than 10 pilots ran their four laps at speeds above 139 mph. The slowest qualifier in the lineup—Frank Armi in the Martin Brothers Special—had a 137.673 run. The *field average* was almost 139 mph.

Customized Truck Bodies

(*Continued from page* 80)

shears—also used are press brakes, drill presses, saws, and grinding equipment. Air power is used for all portable grinders, wrenches, screwdrivers, and drills used on the assembly line.

In addition to the large number of vehicles produced for parcel delivery service, Boyertown also makes a distinctive self-propelled living unit from the same style body as that used for delivery. This unit sells for about $5,500 fob factory including the forward control type truck chassis.

Free LITERATURE

(*Continued from page* 74)

Cold-Flow Sample 22

Two brass parts, illustrating the advantages of dimensional control and surface finish possible with the Cold-Flow process, are offered as samples by *Camcar Screw & Mfg. Corp.*

Flash-Butt Weld 23

Five F-series Synchro-Matic flash-butt welders for automatic precision welding are specified briefly in the May issue of "Flashes." *Thomson Electric Welder Co.*

Alloy Steel Screws 24

A 24-page catalog of alloy steel screws has an easily-followed picture index, physical data, and ASA standards, and for hollow set screws combines all specs on point styles in one chart. *Mac-it Parts Co.*

Heat-Cool Coils 25

User experience with Platecoils for process heating and cooling, 12 strong, is given in brochure No. 154. *Tranter Mfg., Inc.*

Blast Clean 26

Accessories for use with blast cleaning equipment are listed in a 28-page booklet, 300C. *Pangborn Corp.*

Unloading Arms 27

Four sizes of Iron Hand swinging arms, floor-type extractors, transfer machines, specials, and gripping jaws are cataloged and shown in customers' plants in a 16-page booklet. *Saklin Engineering Co.*

Tooling Tips 28

Seven interesting machining operations for saving time are illustrated and discussed in bulletin 3-454. *Gisholt Machine Co.*

(*Turn to page* 160, *please*)

For HYDRAULIC presses, too . . .
it pays to specify BLISS

9 BLISS HYDRO-DYNAMIC PRESSES give fast, versatile production of 90 mm. cartridge cases

Wilson relies on a battery of nine Bliss Hydro-Dyamic presses to keep 90 mm. cartridge case production rolling. In all pre-cupping, drawing, pre-heading, heading and tapering operations, their range of 100- to 2500-ton Bliss presses has proved fast, versatile and easy to work with.

And that's true not only in armaments, but in the aeronautical, automotive and other industries as well: more and more firms find that the Bliss Hydro-Dynamic presses offer the speed, versatility and accuracy they need. For complete information about the many standard and special-purpose Hydro-Dyanamic presses, write or wire for copies of our 36-page Catalog 30-A.

BLISS **on your press is more than a name . . . it's a *guarantee***

Free LITERATURE

(*Continued from page* 158)

Alloy Steels

Economic factors in replacing carbon with alloy steels are discussed in Alloy Steels Pay Off. Write to *Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.*

Reamers 29

The Supeream line of chucking and stub reamers in decimal sizes are priced in bulletins available from *Twentieth Century Mfg. Co.*

Flat Stock 30

Data on Oilcrat precision ground flat stock, in 386 standard sizes, are given in a two-page catalog sheet. *Marshall Steel Co.*

Gear Motors 31

Tri-Clad "55" gear motors, built to new NEMA specifications, are described in 14-page bulletin GEA-6027. *General Electric Co.*

Glands 32

Thermocouples and Packing Glands Catalog 1530 illustrates and describes the full line of bare wire thermocouple glands, packing glands, protection tubes, quick disconnect thermocouples and C-U-P (cflange-under-pressure) glands. *Conax Corp.*

Control Motors 33

Catalog 8203 covers the complete line of industrial control motors and industrial motorized valves, including a price supplement. *Minneapolis-Honeywell Regulator Co.*

Pillar Presses 34

Details on a modernized line of multiple plunger pillar presses, complete specifications and capacities are given in tabular form for six sizes of presses. No. 754-N.2. *Waterbury Farrel Foundry & Machine Co.*

(*Turn to page* 162, *please*)

With saucer grinding wheel, new B&D Sander-Grinder smooths welds, cuts off studs, removes rivets . . .

Equipped with wire-cup brush, Sander-Grinder removes old paint, rust, scale, dirt from tanks, boilers . . .

With B&D Planer Head, Sander-Grinder rough-finishes wood, removes stencil marks from crates . . .

NEW B&D Sander-Grinder with *90% MORE* POWER to Sand, to Grind, to Cut, to Brush!

Black & Decker's *new* 7-inch Heavy-Duty Sander-Grinder has almost *twice* the power of any previous model, it offers higher spindle speeds — your choice of 5,200 or 6,000 rpm — and becomes a more nearly *universal* tool for your shop or plant! Use it for continuous, heavy-duty production . . . and get faster schedules, more output per tool! A B&D-built universal motor, specially designed just for this tool, is your guarantee of 'round-the-clock production. Motor housing is protected from even abnormal abuse, and is contoured to direct exhaust air *away* from operator. Switch-guarded against accidental operation; ball bearings lubricant-sealed. Complete with pad, three sanding discs, all ready to *go*, for only $79.50! See the new B&D Sander-Grinder at your distributor's today, or write for *Free* Form No. 27. Address: THE BLACK & DECKER MFG. CO., Dept. 606, Towson 4, Maryland.

For nearest distributor, see "Tools-Electric"

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

B&D

Free LITERATURE

(*Continued from page* 160)

Electronic Balancing 35

The Electodyne, a new principle for automatically measuring the amount and indicating the angular location of unbalance by means of electronics, is comprehensively described in bulletin 49 just released by *Tinius Olsen Testing Machine Co.*

Ultrasonic Testing

Industrial utilization of ultrasonic waves for non-destructive testing of materials and products, as well as application of the technique to existing quality control systems, are described in an eight-page, illustrated bulletin, No. 50-105. Write to *Sperry Products, Inc., Danbury, Conn.*

See a Profilometer 42

A bulletin describing an in-plant demonstration service on the Profilometer for measuring surface roughness, is available from *Micrometrical Manufacturing Co.*

Compacting Press 43

Bulletin 3104 describes the Model L, 50-ton powdered metal compacting press, and lists its design specifications. *Baldwin-Lima-Hamilton Corp.*

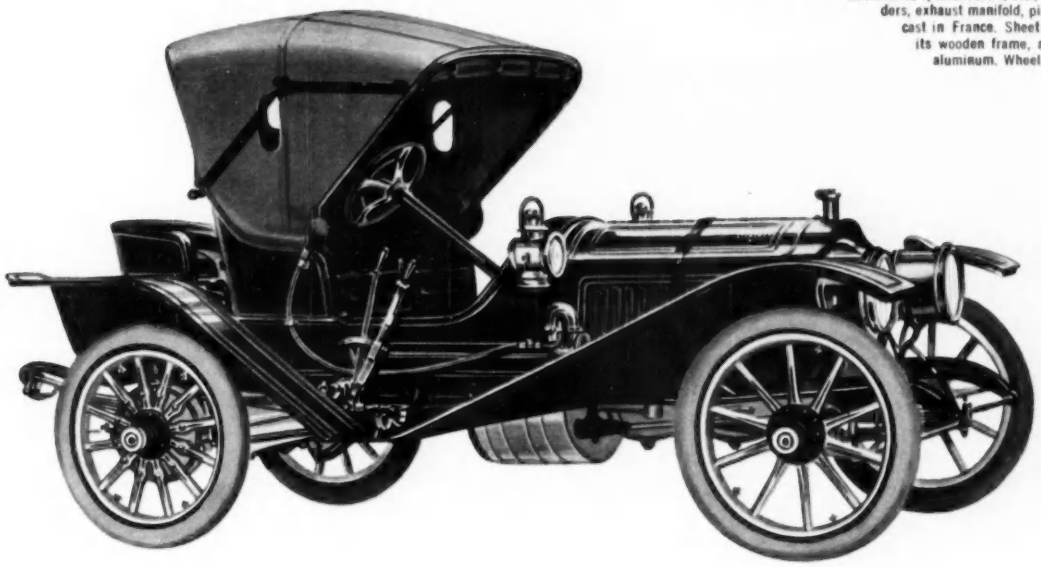
Bending Press 44

Mechanical features and operating advantages of a 20-ton hydraulic bending press are given in a four-page bulletin. *Pines Engineering Co.*

Tube Bending 45

A catalog sheet describing a new line of compact, inverted hydraulic presses adapted to bending and extrusion operations on ferrous and non-ferrous tubular parts as well as upsetting, drawing and coining operations that would require special equipment on standard presses is now available from *Walter P. Hill, Inc.*

Your 1909 Packard "Thirty" Runabout sold for $4200, with top, windshield, special colors, etc., extra. The car's four cylinders, exhaust manifold, pistons and piston rings were cast in France. Sheet aluminum panels covered its wooden frame, and fenders were made of aluminum. Wheelbase 123½", tires 36" x 4".



Ask the man who owns one.....

THIS was more than an automobile. To many a successful man it was a symbol of his success. Frequently, from the mere fact of possession, it served to project the personality of its owner in a way that filled a soul-satisfying need.

Who, then, could measure the value of a 1909 Packard? Wisely, the men who made and sold them said . . . "Ask the man who owns one . . ."

We have come to believe that its builder poured his heart into the making of this fine car. His heart, his creative spirit, became a part of the car.

Thus, the proud owner of a Packard found in his automobile a visible expression of his own creative nature . . . an expression in line . . . and color . . . in pleasing line . . . and warm, appealing color.

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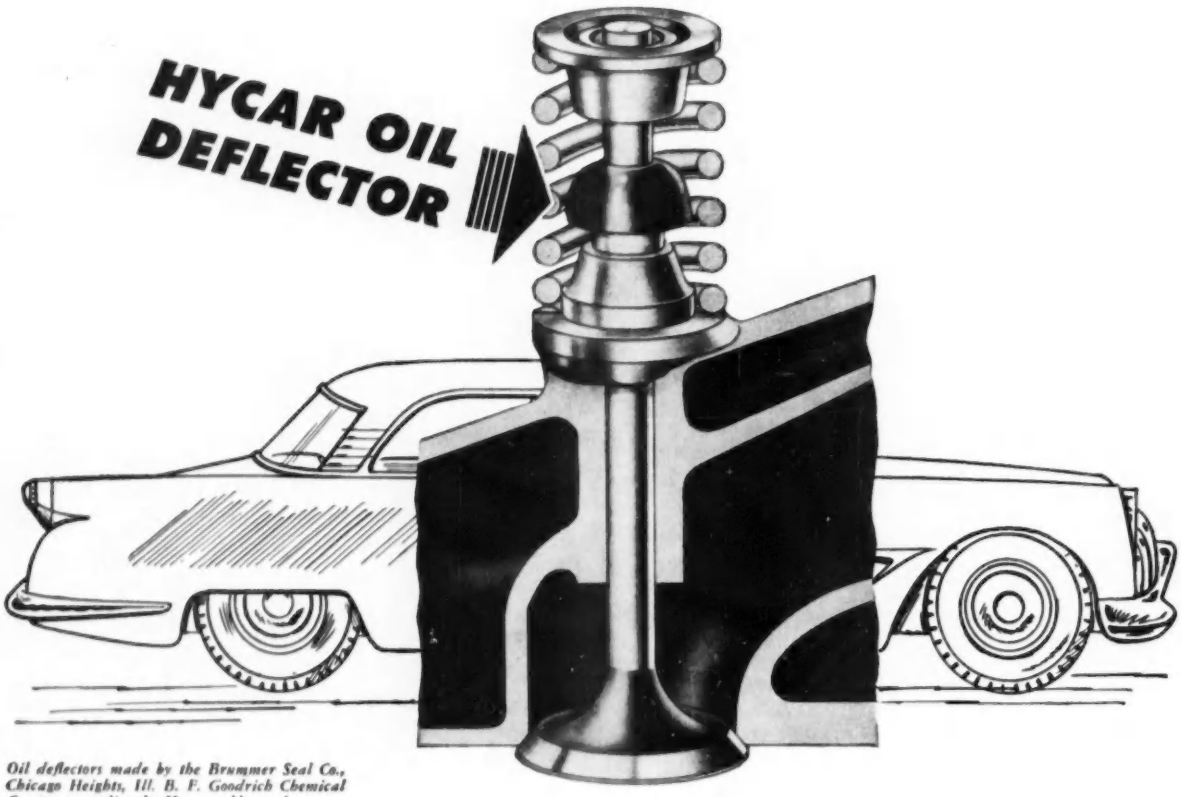
America's leading manufacturer of fine lacquers, enamels and undercoats for automobiles, trucks, farm equipment, appliances, and numerous other products of industry. We invite your inquiry.

Another new development using

B. F. Goodrich Chemical *raw materials*



Oil deflectors made by the Brummer Seal Co., Chicago Heights, Ill. B. F. Goodrich Chemical Company supplies the Hycar rubber only.

DESIGN IMPROVEMENT IN OVERHEAD VALVE ENGINES

HERE'S an idea that eliminated a major cause of sparkplug fouling in overhead valve engines. A flexible umbrella-like part was designed that prevents oil from running down the valve stem into the combustion chamber. But one big problem was to find a material that keeps its strength and flexibility when drenched with hot oil for long periods. Hycar American rubber was the answer! It was the only material of many tested that withstood the tough operating conditions.

Molded from Hycar, the oil-wet deflectors are subject to temperatures above 200° F. during engine operation and below 0° F. in winter. The deflectors showed practically no deterioration after thousands of hours in actual road tests.

This new use for Hycar American rubber may give you an idea for solving a difficult design problem where severe operating conditions must be met. Parts made from Hycar—such as O-rings, seals, gaskets, etc.—are ideal for many applications requiring exceptional resistance to oil, abrasion and high temperature aging. For information, please write Dept. HG-3, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
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Hycar
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors

CALENDAR

OF COMING SHOWS AND MEETINGS

National Metal Trades Association, plant management conference, French Lick, Ind. .....June 20-23

ASME Semi-Annual Meeting, Hotel William Penn, Pittsburgh, Pa. June 20-24

AMA General Management Conference, Hotel Statler, New York, N. Y. .....June 21-23

IAS Summer Meeting, Los Angeles, Calif. .....June 21-24

American Helicopter Society, tenth annual forum, Mayflower Hotel, Washington, D. C. .....June 24-26

Truck, Trailer, and Equipment Show, Los Angeles, Calif. ..June 24-27

Western Plant Maintenance Show, Los Angeles, Calif. .....July 13-15

SAE West Coast Meeting, Los Angeles, Calif. .....Aug. 16-18

Leipzig Trade Fair, Leipzig, Germany .....Sept. 5-15

National Fluid Power Association, fall meeting, Hotel Commodore, New York, N. Y.....Sept. 7-9

Society of British Aircraft Constructors, exhibition and flying display, Farnborough, England Sept. 7-12

SAE National Tractor Meeting, Hotel Schroeder, Milwaukee, Wis. Sept. 13-16

First International Instrument Congress and Exposition, Philadelphia, Pa. .....Sept. 13-24

Fourth European Machine Tool Exhibition, Milan, Italy.....Sept. 14-23

National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J. .....Sept. 15-17

Society for Experimental Stress Analysis, annual meeting and exhibition, Bellevue-Stratford Hotel, Philadelphia, Pa. ..Sept. 21-23

National Industrial Packaging and Materials Handling Exposition, Chicago, Ill. .....Sept. 28-30

SAE National Aeronautic Meeting, Statler Hotel, Los Angeles, Calif. .....Oct. 4-9

National Conference on Industrial Hydraulics, Sheraton Hotel, Chicago, Ill. .....Oct. 14-15

National Safety Congress and Exposition, Chicago, Ill. .....Oct. 18-22

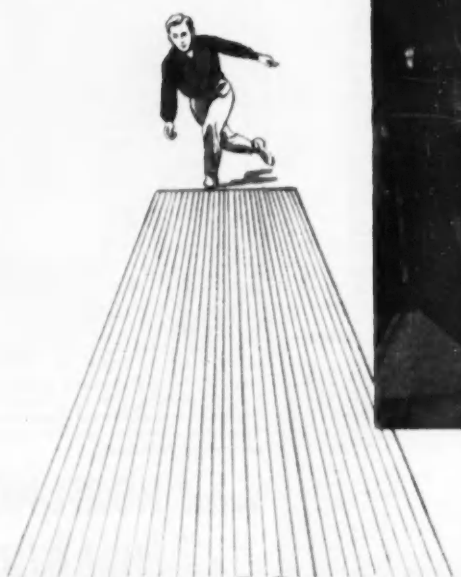
SAE National Transportation Meeting, Boston, Mass. .....Oct. 18-22

National Lubricating Grease Institute, annual meeting, Mark Hopkins Hotel, San Francisco, Calif. .....Oct. 25-27

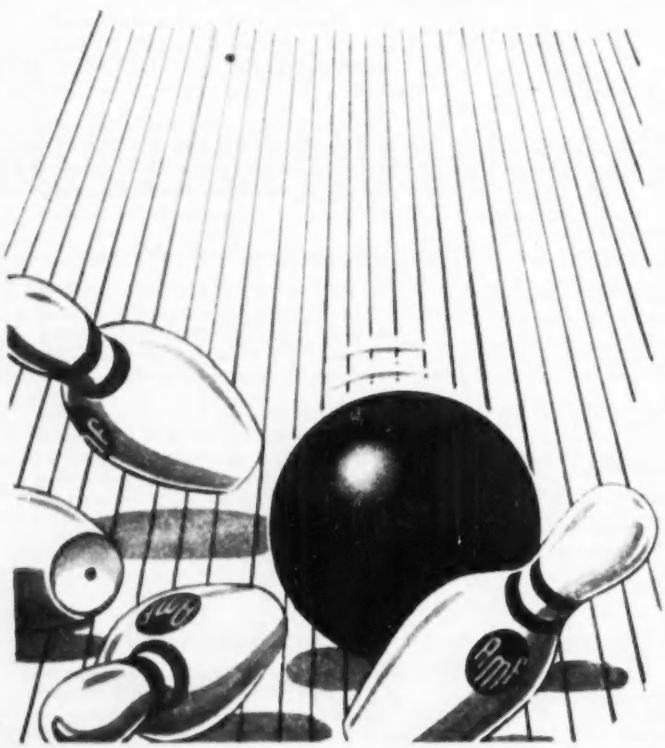
SAE National Diesel Engine Meeting, Statler Hotel, Cleveland, Ohio .....Oct. 26-27

Twelfth Annual Diffraction Conference, Mellon Institute, Pittsburgh, Pa. .....Nov. 3-5

SAE National Fuels and Lubricants Meeting, Mayo Hotel, Tulsa, Okla. .....Nov. 4-5



How Doehler-Jarvis is helping AMF



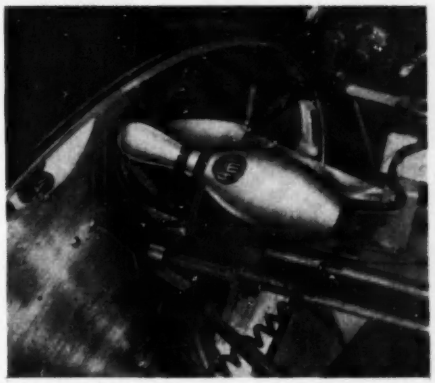
story of AMF's unique Automatic Pinspotter and the 99 Doehler-Jarvis die castings that make it economically practical.

Crac . . . ck! Your pins fly . . . all but four!

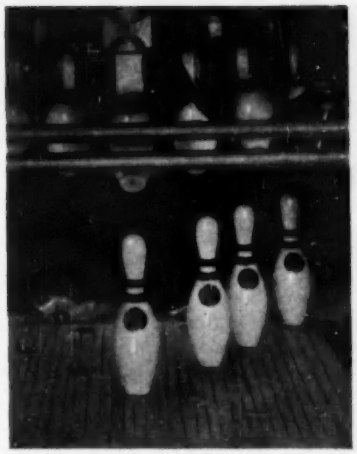
Woosh! The pinspotter goes into action, the instant your ball hits the pit . . . to lift the four standing pins, sweep deadwood into the pit, return the ball to you, and re-set the four standees *exactly* where your first ball left them.

Crac . . . ck! Your second ball hits to give you your 10th frame spare, extra ball, and then the game. As the pinspotter spots a new set of pins, you take time out for refreshment . . . and a look behind the scenes at the marvelous machine that automates bowling.

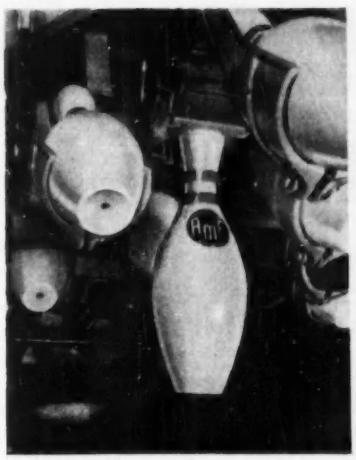
This unique pinspotter practically thinks for itself, adjusts to all the variables of the game and bowler. It is simple, as fast as the bowler, precise, and unbelievably reliable.



"Pinwheel" lifts pins from pit to distributor which delivers them into die cast spotting cups (left). Other Doehler-Jarvis castings are used to guide rods that clamp pins to "pinwheel" and to mount distributor head (above).



Standing pins moved off spot by first ball, must be held above pin deck for return to same position for second ball while deadwood is swept away. How the pinspotter accomplishes this is shown below.



Sponge rubber pad, supported in a Doehler-Jarvis die casting, locates the "off-spot" pin, grasps it, lifts it, and puts it down exactly where it was before, thus conforming with one of the game's most rigid rules.

automate bowling...

It could be prohibitively expensive . . . A production man's nightmare.

But American Machine & Foundry Company found ways to keep costs down. Right at the start they brought Doehler-Jarvis into the picture.

Together, engineers from both companies went over the prototype piece-by-piece, operation-by-operation... looking for the best ways to keep machining and weight down, precision and durability up.

The result of these meetings of minds? Doehler-Jarvis is die-casting 99 parts for the pinspotter. At AMF's plant, a hole may be tapped or a light finish cut made . . . but the bulk of the machining and a good deal of expense is avoided. As one AMF engineer puts it, "anytime you can eliminate machining today, you're certainly saving money."

Cutting costs for customers, big and little, is a Doehler-Jarvis specialty. Some of the best-known makers of automotive, electrical, communication, household, and office equipment count on Doehler-Jarvis to help them take full advantage of the die casting process.

You can count on Doehler-Jarvis, too...to apply to your problem the savvy in die design and parts production developed in our 50 years in this business. Call us in early in the planning stage.

Doehler-Jarvis Division
of
National Lead Company
General Offices: Toledo 1, Ohio

*Reg. U. S. Pat. Off.

SHORTIES

More glass was used in passenger cars made last year than in all homes built during the same period.

•

Farmers in the United States use twice as much petroleum-driven horsepower as the total consumed by all the nation's factories.

•

The average oil well in this country produces about 12.7 barrels per day. The average price per barrel of crude oil is $2.82.

•

Unit costs go up when aircraft are ordered in small quantities and go down when they are produced in substantial volume. Typical of these savings is the case of a modern jet plane now being flown by the Air Force. The first 50 planes cost approximately 65 per cent more per unit than did the following 500.

•

An estimated 1600 U.S. manufacturers today are engaged in making aircraft components.

•

Electronic devices in an all-weather interceptor use enough tubes and bulbs to supply 80 home radios.

•

Plants, ramps, and yard areas of a single U.S. aircraft manufacturer cover almost 62 million sq ft, enough area for 1270 football fields.

•

Seventy-five per cent of downtown off-street parking space added in 10 cities during the past four to seven years was privately financed. Further, 90 per cent of existing off-street parking space in downtown districts is privately owned.

•

The Federal government now owns 1380 fewer automobiles, uses three million sq ft less office space, and has 148,000 fewer employees.

ON OUR WASHINGTON WIRE

More U. S. jet plane strength is in the making. Total military planes now number about 33,000, a third of them jets. By mid-1957, the total is to be 40,000, including 20,000 jets. Air Force is ready to spend $100 million a year to develop a medium bomber that will replace the swift B-47.

A firm that moves its plant for economic reasons and not to avoid bargaining with a union need not reinstate discharged employees nor pay them back wages, the Fifth Circuit Court of Appeals has ruled. Any company, having committed no unfair labor practice, has the right to close its plant without consulting the union and to endeavor to save some of its investment, the court held.

The outlook is brighter for funds with which the U. S. Census Bureau could carry out a delayed census of business, manufactures, and mining. Commerce Dept. is asking Congress for around $8 million in supplemental funds for this purpose.

U. S. corporations curtailed their outside fund-raising in the first three months of this year 10 per cent below the corresponding period of 1953, according to the Securities & Exchange Commission. Total new stocks and bonds up for sale in the first quarter of 1954 amounted to $1.8 billion.

Congressional approval of a new renegotiation law may be expected before July. Broad outline of the new law has not yet been determined within Congress, but the White House reportedly will not permit Congress to adjourn without enacting some sort of renegotiation bill to take up where the old law left off last Dec. 31.

Government's right to penalize companies for wage overpayments in violation of the 1950 stabilization law by denying them tax deductions for the overpayments has been upheld by the Supreme Court. In a unanimous opinion, the court also ruled that the Government has the right to prosecute violations of the law when it was in force even though it expired before the charges were made.

A $5 million money bill earmarked for guided missile research and development is expected to be authorized by Congress soon.

Labor unions and employers have the same responsibility to bargain in good faith, National Labor Relations Board emphasizes in a recent ruling. A union which stages deliberate slowdowns and directs other actions against management while negotiations are in progress is refusing to bargain.

Classified Advertisements

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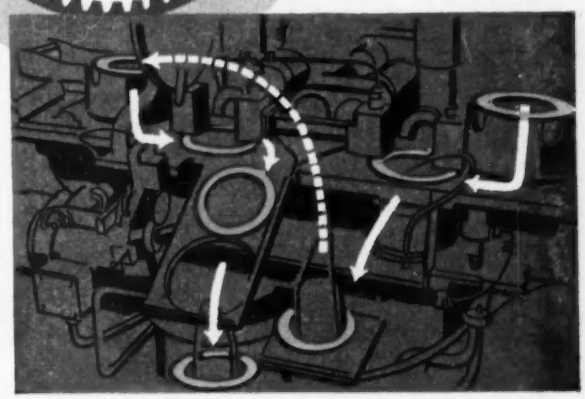
...planning that pays off



Better products at lower cost are usually the result of improved design *plus* improved processing. Take, for example, the clutch plates Moraine makes for automatic transmissions used in automotive vehicles. In the beginning each plate required many separate individual operations. Now these plates are fed into a specially designed automatic machine and completely processed with a great saving in labor costs. This specific example of the "forward thinking" at Moraine benefits both you *and* your customer.

Some cars and trucks with power brakes require a safety feature that would maintain reserve vacuum power for braking. Moraine provides that reserve power—an electrically driven booster pump that maintains an adequate vacuum reserve.

Moraine friction materials, able to withstand great heat and friction, are widely used in Powerglide, Hydra-Matic and Dynaflow automatic transmissions. Their use has spread to other applications . . . from military vehicles to home appliances.

From the truck and bus fields came a desperate request for a tougher bearing to withstand the many requirements of heavy-duty engines. Moraine came up with the answer in the Moraine-400, the *toughest automotive engine bearing ever made!*

Manufacturers are learning that Moraine, through its broad metal-working experience and constructive attitude, has provided a solid foundation for the use of metal powder parts in industry. Every day, Moraine proves "It *can* be done!"

THESE PRODUCTS, TOO, ARE MORAINE

Moraine-100 engine bearings . . . Durex gasoline filters . . . Porex porous metal parts . . . Delco hydraulic brake fluids . . . Delco master cylinders, brake cylinders, and parts . . . Moraine vacuum pumps . . . Moraine conventional engine bearings and electric motor bearings.

moraine products

DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

Special Machinery Division

Builders of Precision and Production Machine Tools since 1898

What flexibility!

New bed type machine mills a wide variety of cams including extra large units

Designed and built by Kearney & Trecker's Special Machinery Division, this bed type cam milling machine helps improve productive efficiency for a textile machinery manufacturer. Offering a wide choice of feeds and speeds, it is capable of milling many types of cams. What's more, the manufacturer gets added flexibility because the machine also handles extra large cams.

Close-up illustrates size of master cams which can be accommodated on this 30 in. dia. cam plate.

Its features include:

- ✓ 24" dia. fixture plate . . . 30" dia. plate which accommodates master cams . . . and a cam follower head with 40" movement along the ways.
- ✓ Quill-mounted milling spindle with speeds from approx. 50 through 750 rpm through pickoff gears.
- ✓ Fixture unit — with feed rates from .025 to 1.039 rpm and with automatic feed cycle — rotates by power feed through 360°, or beyond, to a predetermined point.

If you have problems that require special machinery — contact your Kearney & Trecker representative.

Capacity . . . Experience . . . Performance

Now completed is the $5,200,000 expansion of our Special Machinery Division. We offer you (1) unmatched facilities, (2) experience based upon more than 50 years in the design and production of special machinery, and (3) performance, best recommended by our outstanding record of successfully solving many hundreds of unusual machining problems.

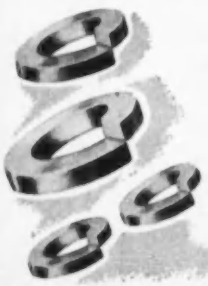
For complete details on this attachment . . .

ask for *Data Sheet No. 1009*. Free booklet describing the facilities of the Special Machinery Division is also yours for the asking. Write today to Special Machinery Division, KEARNEY & TRECKER CORP., 6784 W. National Ave., Milwaukee 14, Wisconsin.

KEARNEY & TRECKER CORP. · *Special Machinery Division*
MILWAUKEE 14, WIS., U. S. A.

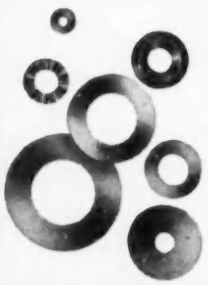
If You Need
SMALL PARTS IN A HURRY
plus sound engineering service
YOU CAN'T BEAT GARRETT!

SPRING LOCK WASHERS



Garrett Controlled Tension spring lock washers assure greater holding power, longer life of every assembly. Garrett makes a complete line of lock washers to ASA and SAE specifications, plus many special types . . . in all metals and plated to your requirements.

FLAT WASHERS



Garrett gives you fast delivery from stock on the largest line of flat washers available. Precision-made in thousands of different sizes and types—standards and specials. Also made to your exact specifications to meet the individual needs of your product.

HOSE CLAMPS

AN 737 . . . stainless steel, radial type with floating bridge and thumb-screw adjustment. Approved for aircraft use.

QS-100 & AN-748 . . . worm-type, self-locking screw. Plated to prevent corrosion. Approved by Armed Forces.

AUTO-SEAL . . . screw-type adjustment, scarfed tongue prevents pinching. Staked bolt and captive nut. Rustproofed.

STAMPINGS

Quick deliveries on small and medium stampings made to your specifications on automatic, high-speed precision presses. Finishing equipment includes tumbling, polishing, heat treating and plating.

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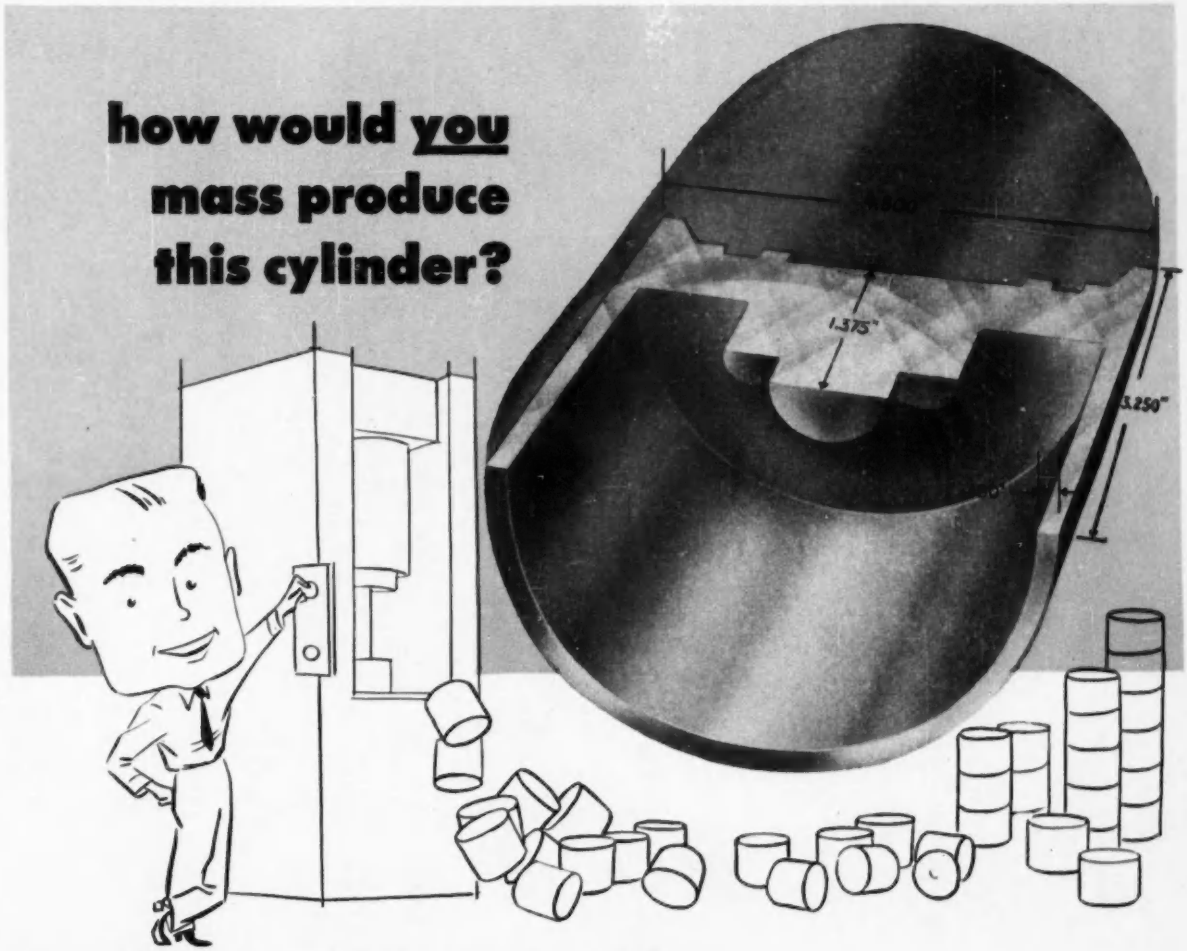
GEORGE K. GARRETT COMPANY, INC. PHILA. 34, PA.



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FROM

HIGH STRENGTH ALUMINUM ALLOYS

Strength requirements of this cylinder were satisfied by using a heat treatable aluminum alloy (minimum yield 55,000 P.S.I.). By the Hunter Douglas cold Impact Forging technique, this high strength aluminum alloy was forged in a single operation to the desired shape...mass production at its finest...with close dimensional tolerances, forged grain flow and walls of zero draft.

The raised stud in the center of the piston offered an added design problem that, by any other process, would present a tremendous time consuming contour milling operation, in addition to high metal waste. The economic advantages of producing this part with minimum metal waste and in a single forging operation are immediately evident. When you are designing a part with the following characteristics:

Walls of zero draft...High physical properties ...Tubular shapes with or without a closed end ...Close dimensional tolerances...Mass production requirements up to a million a month...

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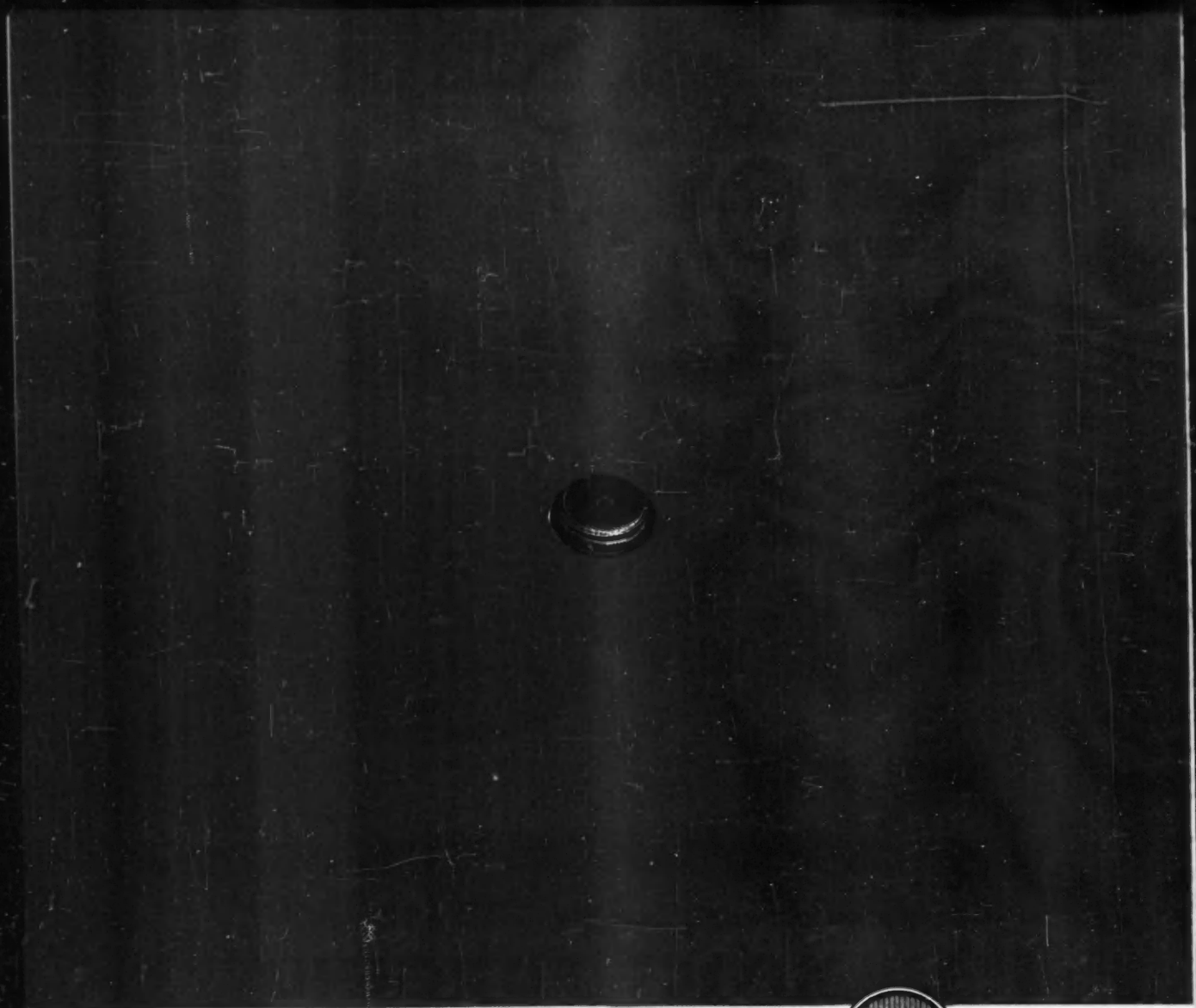

TINY BUT VITAL This little dust boot protects the ignition interrupter switch that shifts gears in automatic auto transmissions. It does that vital job dependably. Like all C/R Sirvene (synthetic rubber) parts, (many are smaller, hundreds are bigger) everything about it is special: design, compounding of oil-resistant elastomers, molding, and quality control of quantity production. Also, it is symbolic. It symbolizes how C/R engineers can serve you, in developing pliable mechanical parts for your own critical applications. Our book, "Engineering with Sirvene" will tell you all about C/R service. Just write us, and we'll send your copy promptly.

C/R

SIRVENE

SCIENTIFICALLY COMPOUNDED ELASTOMERS

CHICAGO RAWHIDE MANUFACTURING COMPANY

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Other **C/R** *products*

Oil Seals: Shaft and end face seals for all types of lubricant retention and dirt exclusion • Conpor: Controlled porosity mechanical leather packings and other sealing products • Sirvis: Mechanical leather boots, gaskets, packings and related products.

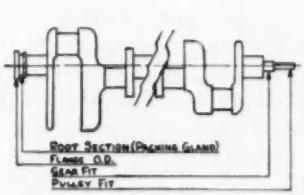
Salvage of rejects speeded by new metallizing alloy

outwears old bearing material 25 times

Automotive manufacturers replace chrome plating installation with metallizing for salvage of mis-machined crankshafts; step up output to 10 per hour

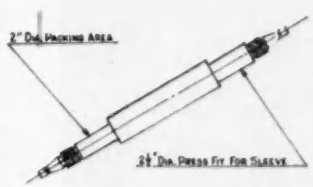
Sprabond Wire, the new self-bonding metallizing alloy, is speeding reject salvage in a wide range of production applications. It has been found particularly valuable in building up parts which have been machined undersize, or damaged by tool marks. Resulting surfaces are extremely hard and, due to their microscopic pore structure, tend to hold considerable amounts of oil. These factors produce excellent wear characteristics, some users reporting increases in service life as much as 25 times that obtained in any other way.

Application is simple and fast; only 3 operations: (1) the part is cleaned or undercut; (2) Sprabond Wire applied; (3) the surface finish-ground. Dovetailing and undercutting often not required and build-up can be carried to a feather edge. No danger of warpage because negligible heat is generated in the part during spraying.



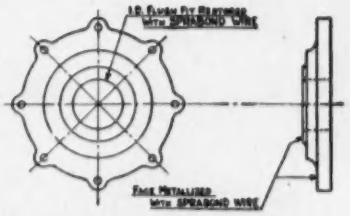
Better and faster than plating

Sketch shows automotive crankshaft of the type being reclaimed in quantity by large manufacturer. These parts were formerly reclaimed by plating, which was slow and expensive. With metallizing, however, production rate is 10 shafts per hour.



Where welding is impractical

Heat warping and consequent straightening costs made welding impractical for salvage of blower shafts such as shown above. Shafts formerly scrapped and replaced are now rebuilt. With Sprabond Wire metallizing, saving is $45.00 each.

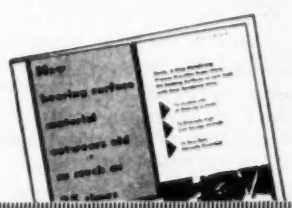


Fits restored—no re-machining

Press fit in electric motor end bell is frequently lost through wear. Welding is impractical here, too, because of warpage. But a few thousandths of Sprabond Wire on the I.D. builds a press fit so that even minimum grinding is often unnecessary. Savings per end bell—about $30.00.

Some other money-saving applications for the Sprabond Wire process

Cracked blocks and castings — flat surfaces — molds, patterns, match plates — sand holes thin sections — lathe ways—inside diameters — gas holes.



FREE Metco Bulletin **57C**, describes the advantages of the Sprabond Wire metallizing process in detail. Micro-photograph of Sprabond Wire coating on steel shows how it works. Use the coupon to send for your free copy today. No obligation, of course.

METALLIZING ENGINEERING CO., INC.
38-14 30th STREET LONG ISLAND CITY 1, N. Y.
In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD. Chobham near Woking, England

The following trade names are the property of Metallizing Engineering Co., Inc.: METCO®, SPRABOND WIRE. ®Reg. U. S. Pat. Off.

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Please send me Bulletin 57C.

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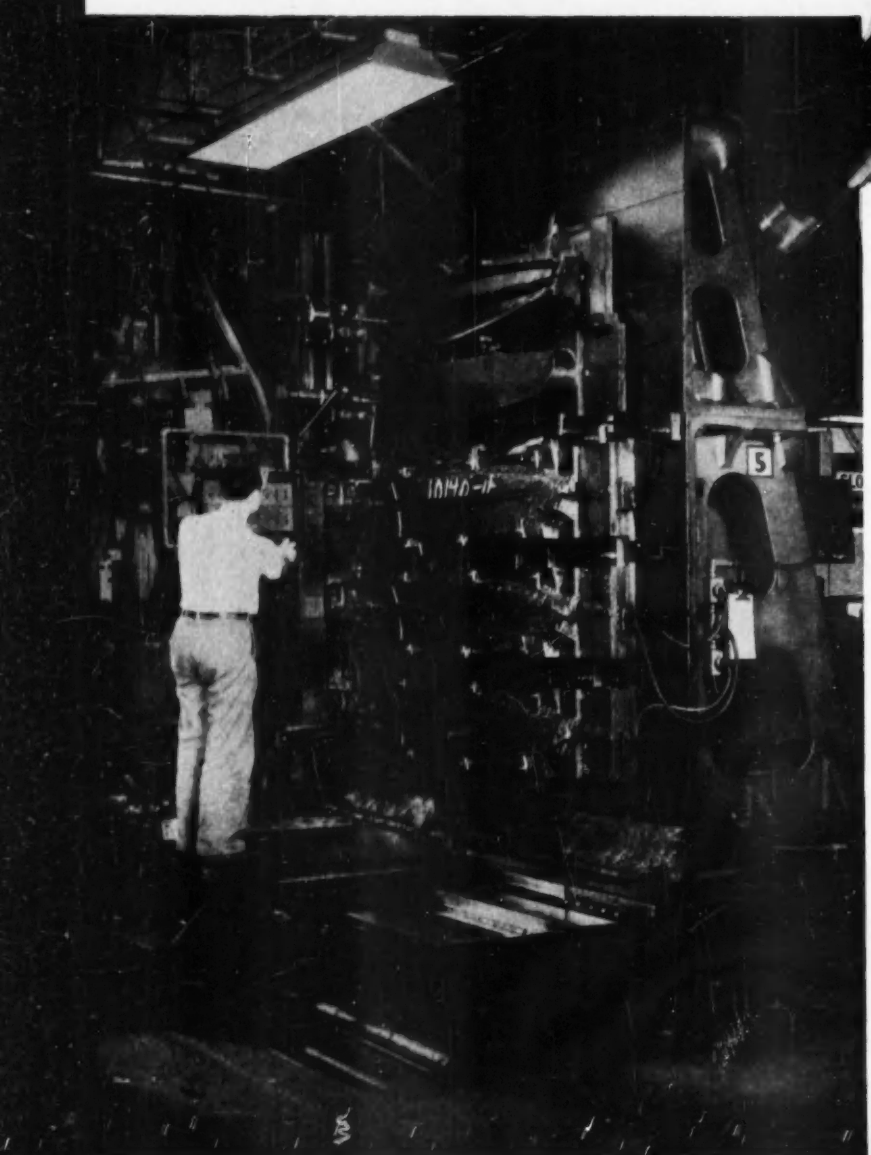
USS Carilloy steel passes rigid tests for propeller blades

BLADE THRUST SECTIONS for military airplane propellers are hogged out on Kellering machines like this one, which reduce the Carilloy steel sections from 750 lbs. to about 155 lbs. Exacting magnaflux tests assure that every finished blade can withstand the tremendous stresses encountered on the latest high-speed planes.



AN important manufacturer of propellers for military aircraft has found that in stringent magnaflux tests, USS Carilloy steel performs completely satisfactorily.

The high stresses in propeller blades and hubs naturally require extremely high quality steels. Accordingly, the U.S. Army and U.S. Navy have set up rigid quality specifications requiring that every heavily stressed part must be magnafluxed several times during its production.

With USS Carilloy 4340 electric furnace aircraft quality steel, this important manufacturer is able to count on the performance required for this severe application. The consistent high quality of USS Carilloy aircraft steel has meant greater savings to this customer through minimum magnaflux rejections of costly parts.

USS Carilloy steels have established an enviable record for meeting the highest quality requirements. Therefore, when you need a standard AISI analysis or a special steel for an unusual application, it pays to call in a USS Service Metallurgist. He can help you solve any steel problem.

UNITED STATES STEEL CORPORATION, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy USS Steels

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

UNITED STATES STEEL

For gasketed parts like these . . .

This FREE BOOK CAN HELP YOU CUT COSTS!

There's something new in this year's cars . . .

IT'S THE DAREX Flowed-in GASKET PROCESS!

And this fact-filled brochure gives you the whole Flowed-in Gasket Story. Here are a few samples of the things you'll read in this informative new book:

ABOUT COSTS

Using the DAREX Flowed-in Gasket Process, a major manufacturer is saving $50,000 per year in labor and materials on a single gasketing operation. As a result of this striking cost reduction, the firm has recommended the DAREX Process for several more gasketing operations.

ABOUT THE PROCESS

The Flowed-in Gasket Process is a new application of a method of sealing developed by Dewey and Almy researchers over 30 years ago, and successfully used in food container manufacture ever since.

The DAREX Flowed-in Gasket Process is more than a sealing compound . . . more than a machine . . . more than an engineering service . . . *it's a complete Process!* So when you switch to Flowed-in Gaskets, you get all three.

Compounds— Over 800 formulations available to meet most needs. Or Dewey and Almy chemists will develop a "job-tailored" compound for you.

Machines— To apply the compound, Dewey and Almy designs and builds machines based on more than 30 years' field experience.

Service— Every machine is precisely adjusted to your specifications before it leaves the shop. When it arrives, a Dewey and Almy Engineer is on hand to install and adjust the machine. Then he trains your operators to full proficiency. And whenever you need him, the Dewey and Almy Man is at your service.

DEWEY and ALMY
Chemical Company
Cambridge 40, Mass.

Offices or subsidiaries in Buenos Aires, Chicago, Copenhagen, London, Melbourne, Milan, Montevideo, Montreal, Naples, Paris, San Leandro (Calif.), Sao Paulo, Tokyo.

Discover what DAREX "Flowed-in" GASKETS can do for YOU

MAIL THE COUPON TODAY!

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Ransburg Electrostatic Processes

Whether it be painting of automobile bodies —(in one case, saving $1.81 per body)— or painting smaller automotive parts, RANSBURG ELECTROSTATIC PROCESSES are accounting for substantial savings to the manufacturer, and to the buying public. *An accumulated savings amounting to several dollars per car!*

In various plants here and abroad, industry is relying upon the unmatched efficiencies of the Ransburg Electrostatic Processes to paint these automotive parts:

BODIES • GARNISH MOULDINGS • DIRECTIONAL SIGNALS • MUFFLERS
SEAT FRAMES • TAIL PIPES • VENTILATOR PARTS • JACKS • ENGINES • HORNS
HEATERS • CARBURETORS • STEERING COLUMNS • TRIM • LAMP PARTS
AIR FILTERS • OIL FILTERS • SHOCK ABSORBERS • RADIOS • HARDWARE
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WHAT DOES IT COST TO USE RANSBURG ELECTROSTATIC PROCESSES? It doesn't COST! It SAVES! Let us show you how Ransburg Electro-Spray can cut your painting costs and provide higher quality work in YOUR finishing department.

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

NEW PROVING GROUND ON WHEELS

records 3 vital braking factors— *continuously • simultaneously • automatically!*

Now we can duplicate any given braking problem—*under actual road test conditions.*

This new testing facility, first in the industry to be completely instrument-equipped, automatically measures and continuously records:

1. Temperatures at all four brake drums.
2. Operating line pressures.
3. Speed and time factors.

Six graphs make synchronized records throughout each test run . . . providing us with brake lining performance pictures never before achieved.

Such information is used to determine specific braking data applicable to friction material research, and helps us continue to provide better brake lining for you.

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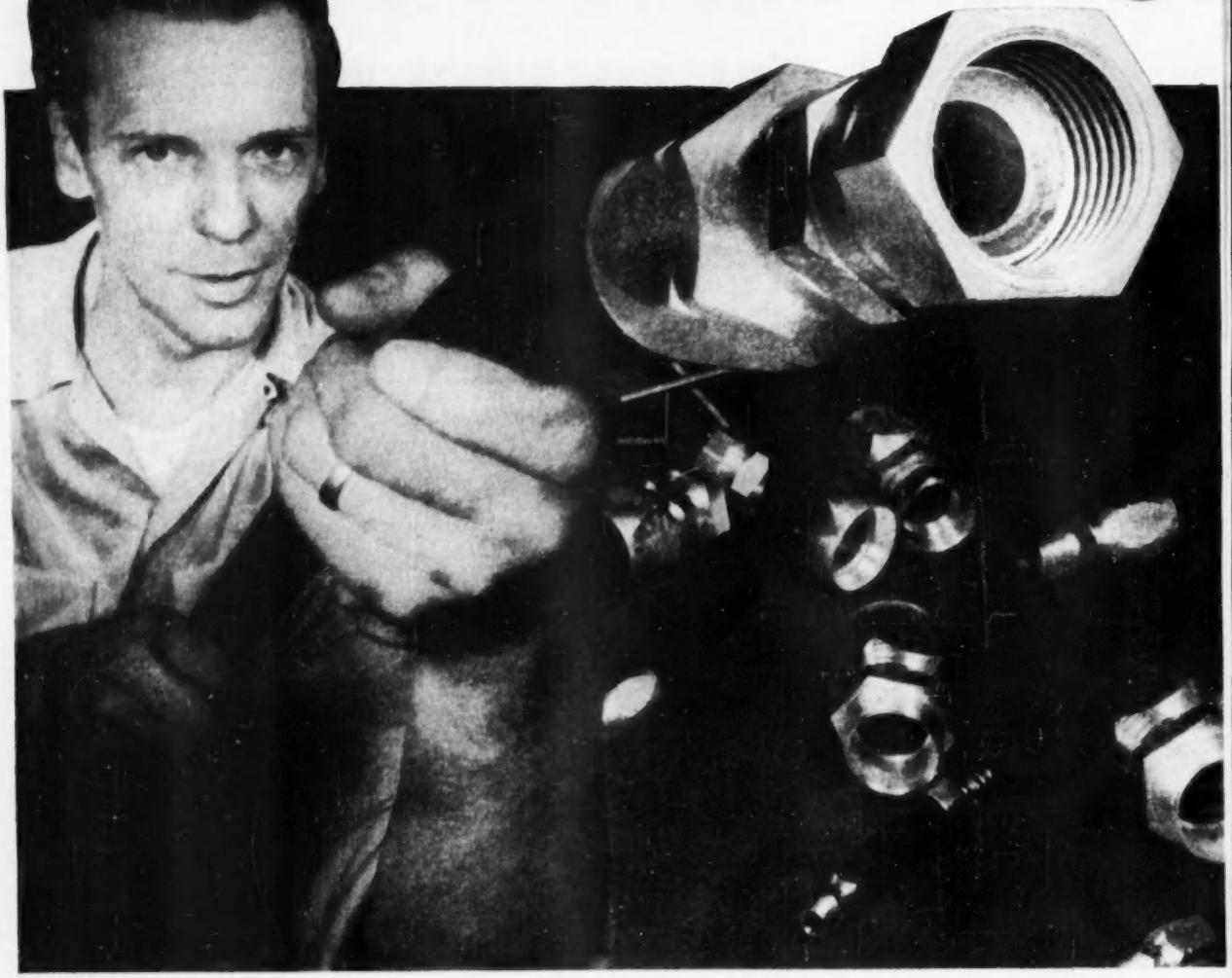
AND U.S. PAT. OFF.
AMERICA'S *SAFETY* BRAKE LINING

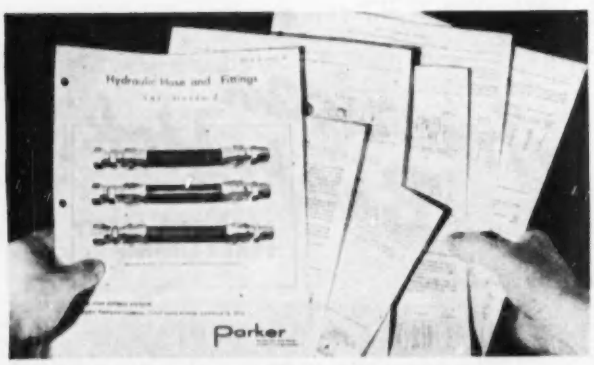
AMERICAN Brake Shoe COMPANY

AMERICAN BRAKEBLOK DIVISION
DETROIT 9, MICHIGAN
Plants in: Detroit, Michigan; Winchester, Virginia; Lindsey, Ontario; Gif, France

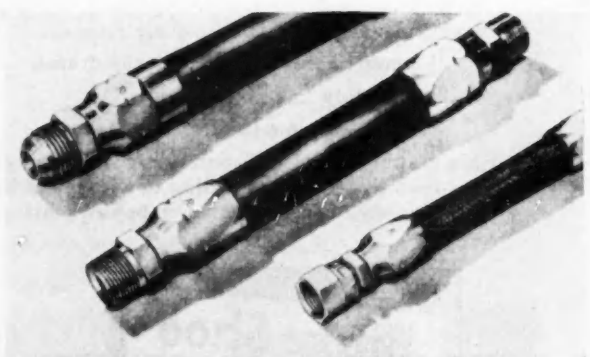
Announcing



Here is *Hoze-lok* showing the type for medium-pressure, rubber-covered, single-wire braid hose. *Hoze-lok* has a unique socket recess to provide greater gripping. It is *re-usable* . . . easy to assemble. End of the socket is streamlined with no abrupt corners to cut assembler's hands. See how *Hoze-lok* fittings have a neat appearance in harmony with modern-design machinery.



S.A.E. Standards for hydraulic hose and fittings are fully met by new Parker *Hoze-lok* fittings. See pages 725 to 730 of your S.A.E. Handbook. Or, simply mail the coupon for the reprint shown above.



3 styles for cotton-covered or rubber-covered, single-wire braid hose in medium-pressure service; for rubber-covered, double-wire braid hose in high-pressure service.

Parker Hoze-lok Fittings

For better performance . . . easier make-up . . . greater re-usability and economy

Look at these unique features of Parker's new *Hoze-lok* fittings and hose assemblies for medium and high-pressure hydraulic service:

Hoze-lok fittings offer longer trouble-free service. They have an unusually large gripping area because of their deep socket recesses. They won't pull out.

These new fittings conform to both S.A.E. Hydraulic Hose and Fitting Standards and the hose fitting specifications of J. I. C. Hydraulic Standards.

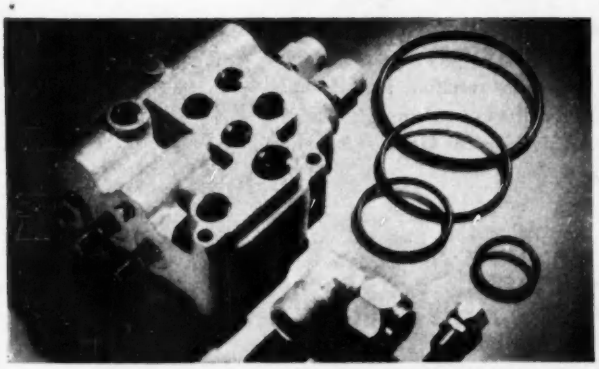
Parker *Hoze-lok* fittings make up easier . . . save time and temper of assemblers. Socket thread is larger than braid diameter, making it easier to insert the hose end into the socket. Contour of the socket provides greater wrench clearance at hex of nipple. Also, this easier make-up simplifies fluid handling for mock-ups or for testing purposes . . . saving expensive engineering time.

Greater re-usability of *Hoze-lok* fittings cuts costs in these ways: Parts of old hose lines can be salvaged, fittings detached and removed. You don't have to carry such a large inventory. A small stock of bulk hose and *Hoze-lok* fittings takes care of most requirements.

Hoze-lok fittings are now available for both medium and high-pressure hose. Also, these new fittings are augmented by a wide range of *Triple-lok* (tube fitting) connecting adapters. Mail the coupon for Catalog No. 4400 and ask for name of nearest *Hoze-lok* distributor.

TUBE AND HOSE FITTINGS DIVISION
The Parker Appliance Company
17325 Euclid Avenue, Cleveland 12, Ohio

Parker
Hydraulic and fluid system components



What other Parker products for hydraulic and fluid systems interest you? *Triple-lok* flare tube fittings? *Ferulok* flareless tube fittings? Hydraulic control valves? O-rings?

TUBE AND HOSE FITTINGS DIVISION
The Parker Appliance Company
Section 405-G
17325 Euclid Avenue
Cleveland 12, Ohio

☐ Please send *Hoze-lok* Catalog No 4400.
☐ Reprint of S.A.E. Standards for Hydraulic Hose and Fittings, Bulletin No. 4405 B1.

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____

Mail this coupon for catalog of complete information about new Parker *Hoze-lok* fittings. If you'd like to know more about other Parker products, please contact Parker for prompt details.

GS ..stands for GEMMER Steering

Genuine Superiority!
Greater Safety!
Greater Savings!

Why does GS mean so much to you? Simply because: GS means Gemmer Steering. It means that here is a product backed by nearly 50 years of manufacturing skill . . . a product which represents countless hours of painstaking research and development . . . the peak achievement of a concern devoted exclusively to the manufacturing of steering gears. GS means Genuine Superiority. A superiority which only time and experience can secure. Gemmer has always led the way . . . Gemmer Pioneered Power Steering! GS means Greater Safety. Gemmer Hydraguide full-time power steering works for you all the time. It removes the you-power from steering, makes driver control easy in case of front wheel obstruction, soft shoulder or blow-out. And GS means Greater Savings. Over 80% of the actual work is done by the Gemmer unit, resulting in less fatigue and fewer accidents resulting from fatigue. Get Gemmer full-time Hydraguide power steering for trucks, automobiles, boats, farm and material handling equipment. Get Gemmer Steering for Genuine Superiority, Greater Safety, Greater Savings.

Pioneers in Power Steering

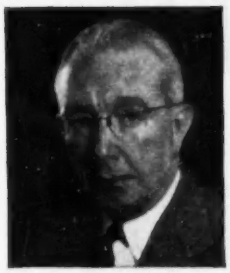
Gemmer Manufacturing Company, Detroit 11, Michigan

In thousands of plants . . .

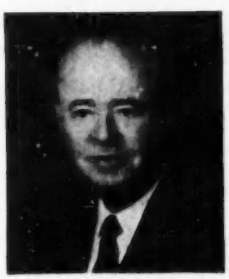
WHEN FLUID LINE TROUBLES ARISE . . . WHEN HOOK-UPS ARE BEING PLANNED OR ALTERED—

Here's why it's almost routine procedure to

call the HANSEN REPRESENTATIVE



WALTER W. NORRIS
Walter Norris Engineering Co., Chicago
Serves Northern Illinois and Eastern Iowa industries with trained personnel offering years of experience in the application, installation, and operation of pneumatic and hydraulic equipment.



W. H. "BILL" NASH
William H. Nash Co. Detroit
During thirty years of service to the automotive, refrigeration, appliance and other industries in Michigan, has supplied engineering analysis of problems related to the transmission and application of compressed air, hydraulic power and vacuum systems.

By the very nature of his job, the Hansen representative is thoroughly familiar with practically every type of fluid line hook-up.

From his years of experience with dozens of installations in his area, he knows what works—and why it does.

That's why, when you run into difficulties, he can frequently make suggestions which will clear up your troubles in a hurry.

Quick-connective couplings are, of course, his main business—but so are fluid line problems either when actual troubles arise, or when hook-ups are being planned or altered. Make use of his services—you'll find his know-how a real help over the rough spots.

REPRESENTATIVES

BALTIMORE	DAYTON	LOS ANGELES	PHILADELPHIA
BIRMINGHAM	DENVER	LOUISVILLE	PITTSBURGH
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QUICK-CONNECTIVE FLUID LINE COUPLINGS

1. QUICK CONNECTION AND DISCONNECTION
2. INSTANT AUTOMATIC FLOW OR SHUT-OFF

One-Way Shut-Off

Two-Way Shut-Off

ALSO STRAIGHT-THROUGH QUICK-CONNECTIVE COUPLINGS

Send for Catalog!

THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

Since 1935 Lindberg Engineering Company has been a leader in metallurgical research and the development of industrial heating equipment.

To 500 VIP's in

Lawrence Remiker

We're not barring any readers, but this advertisement is pointed at just key men . . . top management, manufacturing superintendents, chief engineers . . . or any other VIP's who right today are making a decision to improve their industrial heating processes.

For them, Lindberg now offers a complete planning, designing and installation service through its new Field-erected Equipment Division.

R. A. Hastings

For some time, under certain conditions, Lindberg has been able to provide this service. Now, with added facilities, its established industrial heating know-how can start right in helping to answer over-all production problems in many manufacturing fields.

Headed by Lawrence Remiker and including R. A. Hastings, Elmer B. Jones and C. F. Masure, a management staff of long experience has been assembled. With enlarged plant capacity, this division is organized to

LINDBERG

American Industry

provide a higher degree of service than has ever before been available in this field.

Elmer B. Jones

For example, Field Engineers in 21 Lindberg offices throughout the country will give every contract on-the-spot service from planning right through installation. No remote control.

All fabrication will be done in Lindberg's own plants, a one-package operation that eliminates slow and costly dependence on outside suppliers.

C. F. Masure

Lindberg's large technical staff, its scientific laboratories, its years of experience in advanced metallurgical research provide the best possible background for a complete and satisfactory answer to any industrial heating problem.

If you are one of those 500 VIP's faced with such a problem Lindberg is the best source for reliable and constructive advice. Call your nearest Lindberg field office and one of our engineers will be on the job at once.

LINDBERG FIELD OFFICES

California:	Los Angeles San Francisco
Colorado:	Denver
Georgia:	Atlanta
Illinois:	Chicago
Indiana:	Indianapolis
Massachusetts:	Springfield
Michigan:	Detroit Kalamazoo
Missouri:	Kansas City St. Louis
New Jersey:	Fairlawn
New York:	Buffalo New York City
North Carolina:	Charlotte
Ohio:	Cleveland
Oklahoma:	Tulsa
Pennsylvania:	Philadelphia Pittsburgh
Texas:	Dallas
Washington:	Seattle

ENGINEERING COMPANY

FIELD-ERECTED EQUIPMENT DIVISION

Chicago Plant: 2491 West Hubbard Street • Chicago 12, Illinois

Los Angeles Plant: 11937 So. Regentview Avenue • at Downey, California

A NEW PAGE IN THE HISTORY OF INDUSTRIAL MACHINERY SUPPLY

Now...set up in your plant...ready to produce...

"PACKAGED*

●Piecemeal purchasing is eliminated. Single-source buying enables you to get an integrated installation...in the shortest possible time...for the most attractive investment.

This newly announced service of the Lake Erie Engineering Corporation is not an experiment. It is something we are doing more and more for leading plants throughout industry It is a natural outgrowth of the ever increasing desire of our customers for our specialized services. As a result, we have the resources...the staff...the experience.. to offer you the complete service described at the right. Call us. Then you will fully appreciate the advantages of a central responsible source. You will not be obligated...but you will be pleased.

INDUSTRIES SERVED BY LAKE ERIE ARE TYPIFIED BY THESE CUSTOMERS:

Allegheny-Ludlum Steel Co.
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The Electric Auto-Lite Co.
Ford Motor Company
Goodyear Tire & Rubber Co.
General Electric Company
General Motors Corp.
International Harvester Co.
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LAKE ERIE PRODUCTION EQUIPMENT

HYDRAULIC PRESSES

For all forming operations...forging including shells...extrusion of all non-ferrous metals...extrusion of steel, both hot and cold...molding of abrasives, refractories, metal powder, plastics, rubber and wood...and other production processes requiring the application of pressure.

DIE CASTING MACHINES

Die casting machines for aluminum, brass, zinc and magnesium...including trimming presses, die separating presses, furnaces and tools.

INSTALLATIONS"

of Lake Erie production equipment including tooling

✳ THIS IS THE "PACKAGE"

The complete service or any part of it is available as required.

1. We discuss and explore your requirements with your management and engineers.
2. We submit a detailed proposal for your review and consideration.
3. We prepare an installation layout if one is needed.
4. We design, manufacture, and supply the basic machinery, tools and dies, conveyors, loading mechanisms, furnaces, or any other related auxiliaries.
5. Our field force installs or supervises the installation of the complete equipment in your plant.
6. We place the equipment in operation and train your supervisory and production personnel.
7. We assume responsibility for the satisfactory performance of the equipment as an integrated plant.

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ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

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HYDRAULIC PRESSES • DIE CASTING MACHINES
ROLLING MILL AUXILIARY EQUIPMENT

LAKE ERIE®

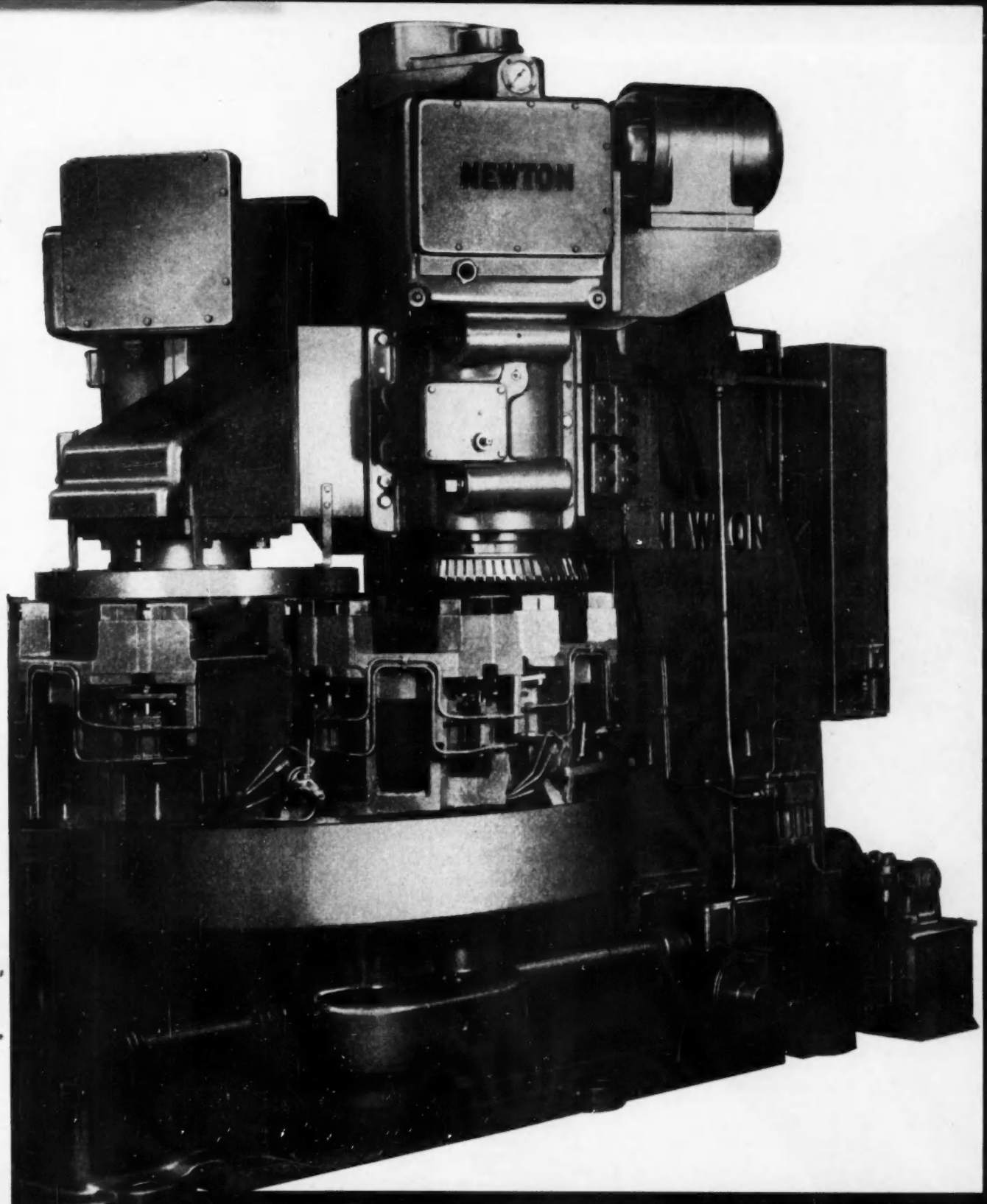
Multiple Milling

Where you have work pieces to be milled on two sides, you can mill both sides on NEWTON VERTICAL ROTARIES in the time required to mill only one side by using double-row fixtures.

This 76 Inch NEWTON VERTICAL ROTARY with double-row fixtures continuously roughs and finish mills two sides of a piece in one pass under the cutters. The fixtures (hydraulically operated) automatically open and close as the table turns.

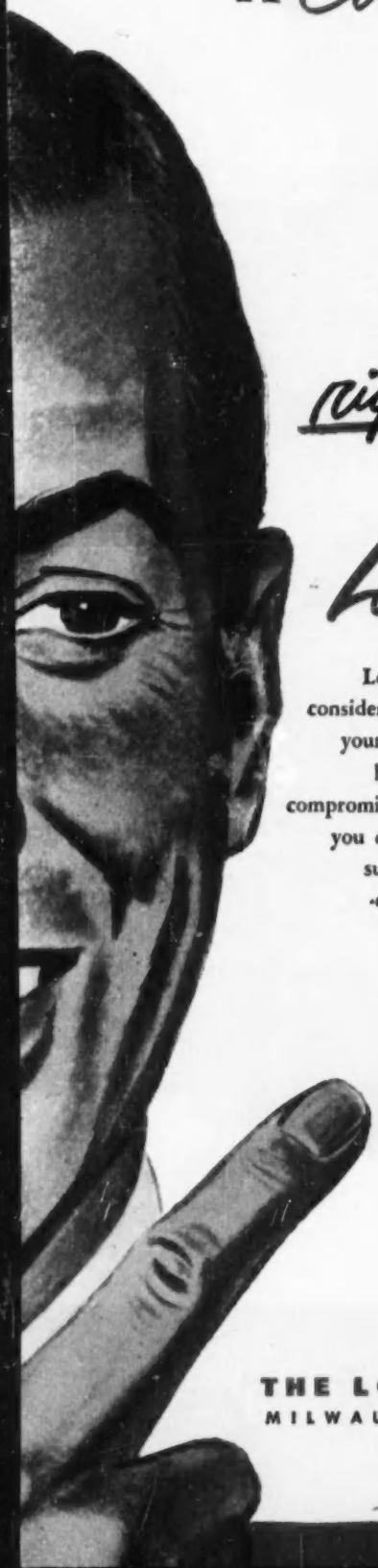
CONSOLIDATED MACHINE TOOL

Wholly owned subsidiary of Farrel-



CORPORATION, ROCHESTER, N. Y.

Birmingham Company, Incorporated

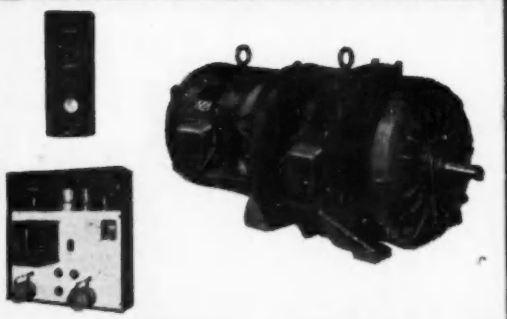


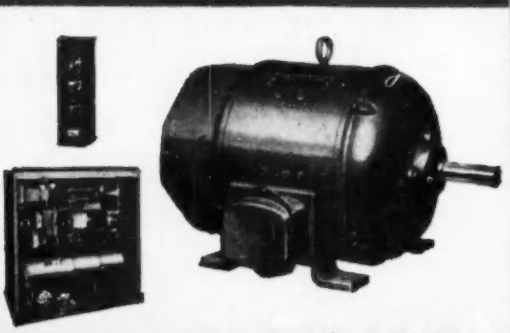
A Complete adjustable speed line

Get the right answer from Louis Allis

It pays to think first of the Louis Allis Co. whenever you're considering adjustable speed drives for your product or plant. Louis Allis builds all basic types. There's no compromising — from this complete line you can select the unit that's exactly suited to your job conditions and engineered for your application.

For the simplest — and best — solution to any adjustable speed drive problem, call your nearby Louis Allis Sales Engineer, or write to us.



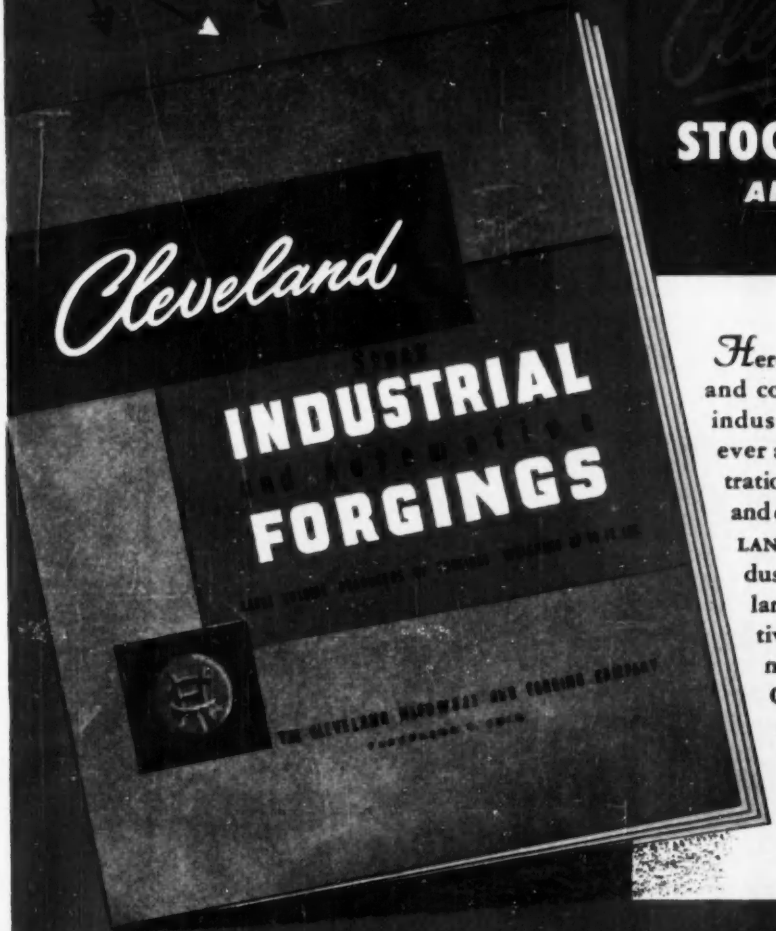


THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN

ASD-101

New! Catalog-19A

STOCK INDUSTRIAL AND AUTOMOTIVE FORGINGS



Here is one of the most convenient and comprehensive listings of stock industrial and automotive forgings ever assembled—photographic illustrations, engineering drawings, sizes and descriptions of every stock CLEVELAND-FORGED product. Serving industry since 1881, the line of Cleveland stock industrial and automotive forgings has expanded as each new requirement has occurred. Cleveland Catalog 19A with part numbers listed in sequence, by product and in numerical order, provides a fast reference and buying guide for:

- ★ LEVERS, OF ALL TYPES
- ★ YOKE ENDS AND ROD ENDS, ALL TYPES
- ★ HOOKS, LIFTING AND TOWING EYES
- ★ EYE BOLTS, TEE BOLTS & TANK STRAPS
- ★ PEDAL PADS
- ★ SPRING SHACKLES LINKS

THE **CLEVELAND** HARDWARE AND **FORGING** COMPANY
3290 East 79th Street, Cleveland 4, Ohio
Our 73rd Year of Business

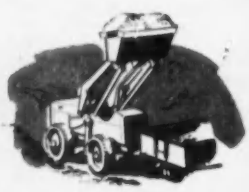
USE THIS COUPON TODAY

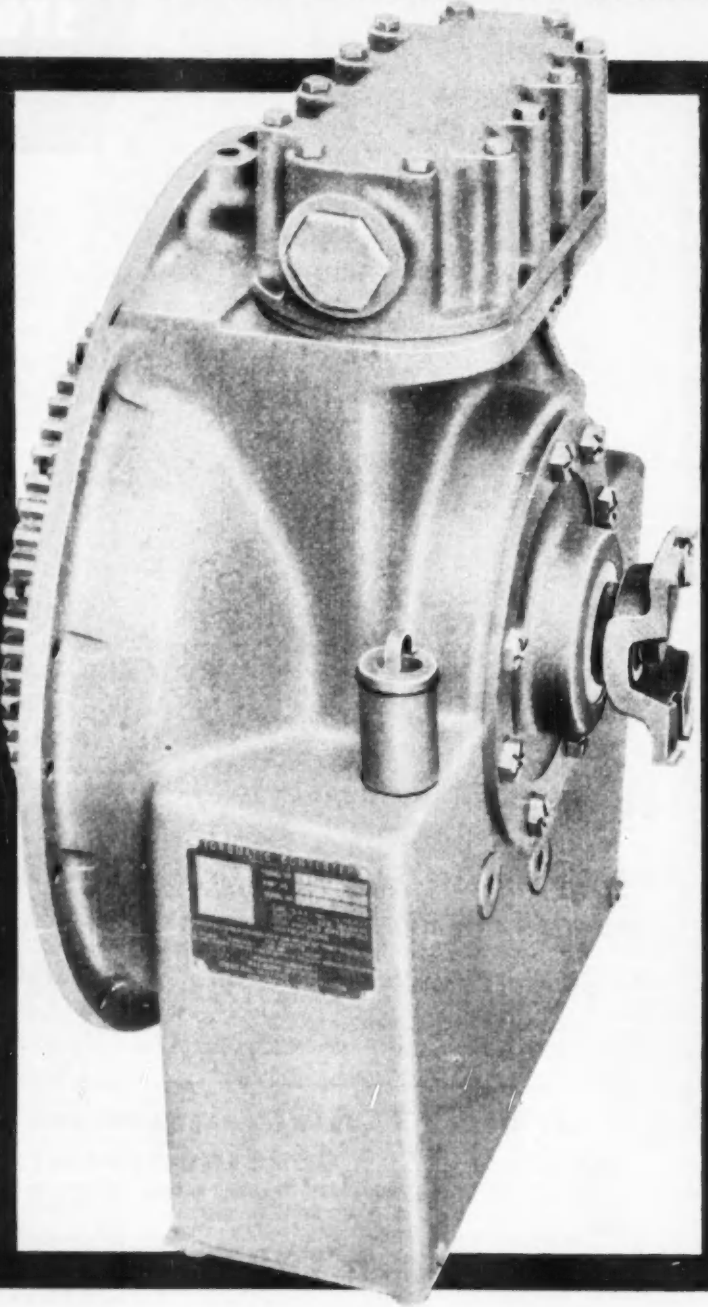
The Cleveland Hardware and Forging Co.
3290 East 79th Street, Cleveland 4, Ohio
Send the new, complete Cleveland Stock Industrial and Automotive Forgings Catalog 19A to:

Name .....
Company .....
City ..... *Zone* ..... *State* .....

NOW LOW-COST HEA

EASY TO INSTALL **COMPLETELY SELF-CONTAINED**





VY-DUTY TORQMATIC CONVERTERS

For 40-150HP Gasoline- or Diesel-Powered Equipment

HERE, for the first time, are Allison TORQMATIC Converters designed for hard-working gasoline- or Diesel-powered equipment in the medium horsepower range.

These new torque converters are true heavy-duty units *priced to compete* with converters designed primarily for passenger cars—*priced to sell for less* than most comparable industrial-type converters.

And they fit your equipment with little or no change in your design.

Easy installation

New Allison TORQMATIC Converters are completely self-contained for simplified flexible installation—feature integral oil system including charging pump, oil cooler and oil sump. No outside oil lines required. Integral gear drive for easy mounting.

Standard SAE #3 mounting dimensions and conventional internal-external drive gear like that used in ordinary clutch power take-offs simplify installation.

Three different models give you a wide selection of torque ratio and capacity.

Options include front disconnect clutch and adapter, rear disconnect clutch adapter, standard flange as shown, industrial shaft with or without governor drive and oil cooler.

Why use a torque converter?

Your equipment lasts longer with an Allison TORQMATIC Converter transmitting power because it protects engines and driven equipment from harmful shock loads—one of the main causes of equipment breakdowns.

And you get more work from your units, too. New Allison TORQMATIC Converters multiply engine torque up to 3½ times and also provide more production because they broaden your engine's effective horsepower range. When torque output equals load demand the TORQMATIC Converter acts as a fluid coupling to conserve fuel and boost engine life.

Ask your engine or equipment manufacturer about Allison TORQMATIC Converters for your hard-working 40- to 150-horsepower units or mail the coupon.

GM GENERAL MOTORS

Allison

TORQMATIC DRIVES

Allison Division of General Motors
Box 894A, Indianapolis 6, Ind.

Please send me Bulletin SA 1031

Name_____

Position_____

Company_____

Address_____

The multiple nut setter on this automobile assembly line is simultaneously tightening four nuts on the U-bolts which attach the rear axle to the springs. Continued inspection shows that production is held well within the 60-65 ft-lb of torque specified on this operation.

Keller's New

Multiple Nut Setter

saves time — holds torque limits !

The new Keller Multiple Nut Setter simplifies many difficult nut setting problems, increases production, and reduces assembly costs. The new tool includes these important features:

ACCURATE TORQUE CONTROL

The torque on each nut can be held to such close tolerances that only limited quality control inspection is necessary.

INDIVIDUAL TORQUE ADJUSTMENT

Torque regulator is built into the head of each drive spindle, providing individual torque control.

MULTIPLE OPERATION

Sets two to six nuts simultaneously. Finding nuts or bolt heads is simple with new axially resilient socket adapters.

COMPACT DESIGN

Offset drive spindles and compact construction of the drive unit allow close spacing where nuts or bolts are closely clustered.

FLEXIBILITY

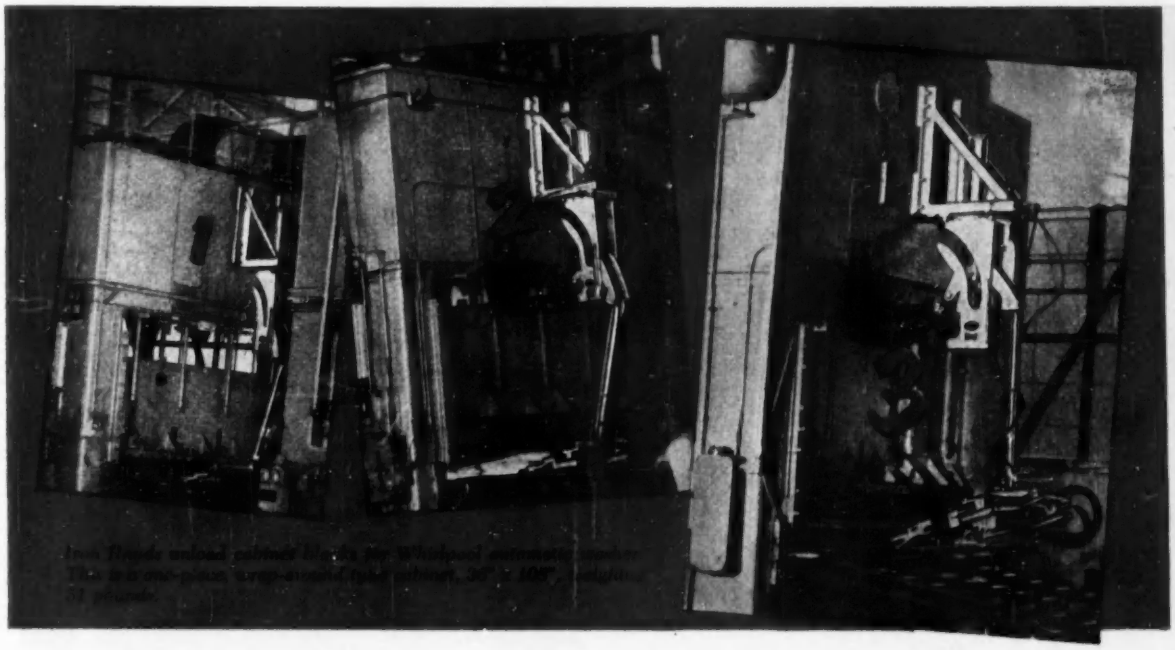
Mounting plates to hold the spindles can be made up in the tool room or machine shop to fit any bolt pattern. Thus conversion to new production jobs is simple.

Ask for Bulletin No. 12

KELLER

Pneumatic Tools

KELLER TOOL COMPANY
1317 Fulton Street
GRAND HAVEN, MICHIGAN



Whirlpool installs 3 Iron Hands!

Saves $20,000 annually... reduces accident hazard

Dependable operation of Iron Hands boosts production of automatic washers

Whirlpool Corporation recently installed Sahlin Iron Hands on three presses to automatically unload 51-lb. cabinet blanks for their automatic washers. By using the maximum press capacity for the first time, they obtained immediate increase in production—an increase, which according to Whirlpool officials, results in savings "in excess of $20,000 annually".

In addition to dollar savings, manpower requirements were reduced 40%. And the accident hazard was cut proportionately. Moreover, the three Iron Hands have given dependable service since their installation.

But Whirlpool's experience is no different from that of hundreds of others. Now, virtually every large stamping plant in the world uses these swinging arms to unload all types of press stampings—large and small. And they can be applied with equal efficiency to brakes, shears and forging machinery. The Iron Hand principle has also been adapted to floor-type extractors and to special feeding and unloading machines.

Join industry's swing to automation. Investigate the Sahlin Iron Hand. You'll find it can be equipped with a gripping jaw to handle practically any press stamping. Send for your free catalog today.

SAHLIN ENGINEERING COMPANY
267 Ferndale Street, Birmingham, Michigan
Representatives in: Cleveland • Dayton • Toledo
Pittsburgh • Philadelphia • Buffalo • Syracuse
Indianapolis • Los Angeles • San Francisco • Seattle
London • Paris • Milan

SAHLIN IRON HAND —*to raise pressroom standards*

SAHLIN

How we opened the door to lower costs for Ford

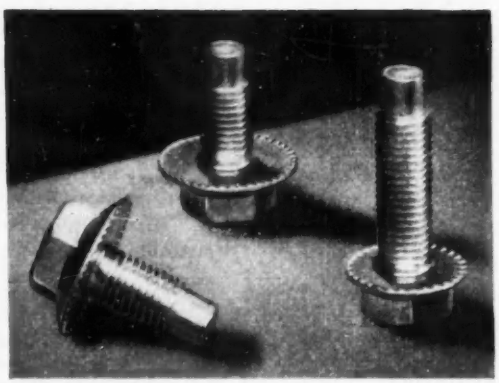
Two hinges on every Ford door. Six screws and 12 washers for each hinge.

Did this present an opportunity for cost reduction? An RB&W "fastener engineer" thought so. And after careful analysis and time studies Ford engineers agreed.

The solution: RB&W Hex SPIN-LOCK screws to fasten the hinge to the door, eliminating the need for washers. And special wide-flange Hex SPIN-LOCK screws for attaching the hinge to the frame, doing away with more washers. The wide flange is necessary to cover an elongated hole in which the hinge moves to permit accurate alignment.

Result — parts requirements are cut by two thirds, assembly is simplified, purchasing and inventory costs are lowered. And RB&W SPIN-LOCK screws hold those door hinges tight for good.

We will be glad to send an RB&W man around to check up on your fastening operations. Every problem is different, of course, but RB&W has a fastener for just about every job. If you need a "special", as Ford did, we'll design and make it for you. Write RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY, Port Chester, New York.



FASTER ASSEMBLY, reduced costs were the pay-off, using RB&W designed wide-flange SPIN-LOCK screws (left) for door hinge. Other SPIN-LOCKS (right) hold hinge on door. SPIN-LOCK screws *can't loosen* because ratchet-like teeth lock into surface and hold tight.

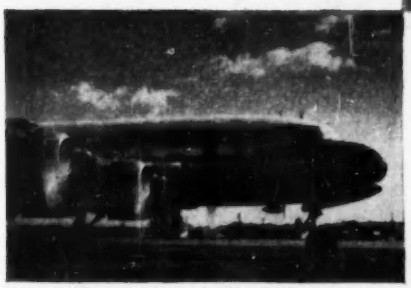
3.10

RB&W

109 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

Plants at: **PORT CHESTER, N.Y.; CORAOPOLIS, PA.; ROCK FALLS, ILL.; LOS ANGELES, CALIF.** ***Additional sales offices at:*** **ARDMORE (PHILA.), PA.; PITTSBURGH; DETROIT; CHICAGO; DALLAS; SAN FRANCISCO.** ***Sales agents at:*** **PORTLAND, SEATTLE.** ***Distributors from coast to coast.***

Putting the finishing touches on the great new Douglas DC-7



Newest thing on wings, the big DC-7 can carry 60 passengers from coast to coast non-stop in 7½ hours.

Binks spray gun ready to stencil insignia on engine nacelle of new air-conditioned DC-7.

Wherever finishes are important

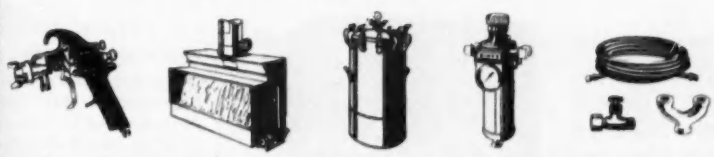
The giant Douglas DC-7 is America's fastest and most luxurious airliner. For every construction detail Douglas specified the best and finest of the nation's production equipment and materials...including Binks spray painting equipment.

There are good reasons why leading manufacturers of all kinds specify Binks spray painting equipment: Spraying coatings has been a specialty at Binks for over 50 years. During that time Binks has experimented with virtually *all* types of sprayable materials and has developed a complete line of manual and automatic equipment for their application. This widely varied experience has produced better equipment and sounder counsel for those who want finer finishes faster.

Let Binks experts help you. They know manufacturing processes...and are always ready to work with your engineers in developing the best and simplest answer to spray painting and coating problems.

BINKS MANUFACTURING COMPANY
3120-30 Carroll Ave., West, Chicago 12, Illinois

Binks
EVERYTHING FOR SPRAY PAINTING



GUNS • SPRAY BOOTHS • FLUID TANKS • EXTRACTORS • ACCESSORIES

REPRESENTATIVES IN PRINCIPAL U. S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

HEAR THE NEWS?

it handles like a one-piece ring!

NEW MUSKEGON

"UNITIZED"

CHROME PLATED OIL RINGS

Have *you* heard about Muskegon's great new advance in piston ring design and manufacture? It's really new, different, better than ever before . . . a *multiple-piece* ring that handles like a *one-piece* ring!

Have you heard how it's done? The secret is Muskegon's patented *Unitizing* process that holds the pieces together in the right order for quick, easy installation. Then, as the engine starts to run, the special adhesive dissolves completely in the hot oil . . . leaves the parts of the ring free to function perfectly and independently of each other.

But *seeing* is believing. Test Muskegon's CSR-200 rings in your own engines, in your own laboratory. Discover for yourself how the mirror-smooth chrome plated rails reduce ring wear and bore wear, scuffing and friction. You'll be amazed at the resulting longer engine life and increased oil economy!

Now listen to this: the price of these better rings is just *half* that of chrome plated cast iron oil rings! Isn't that music to your ears? Write today for complete details.

DETROIT OFFICE:
521 New Center Bldg.
Telephone: Trinity 2-2113

MUSKEGON Piston Rings

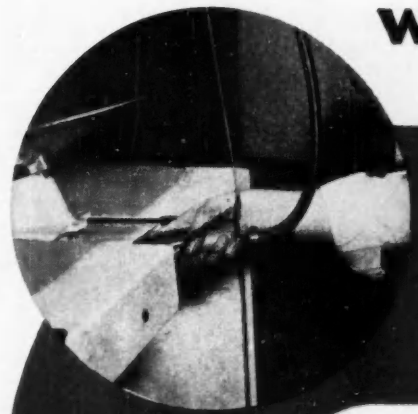
MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

Since 1921... The engine builders' source!

How AIRengineering can

REDUCE YOUR FASTENING COSTS

with IMPACTOOLS

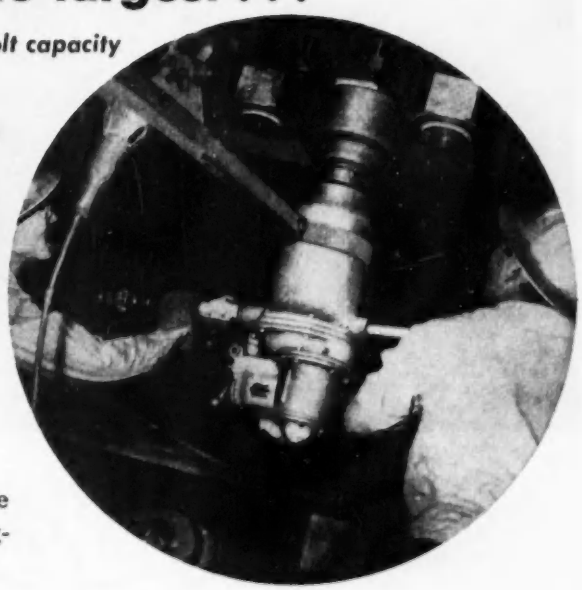


from the smallest . . .

7/32" bolt capacity

to the largest . . .

4" bolt capacity



I-R Impactools can save you up to 90% of the time required to perform nut running and bolting-up operations by hand methods.

Whether your operation calls for tightening or loosening nuts on tiny fraction-of-an-inch bolts or larger bolts up to four inches thread size, there's an I-R Impactool to do the job faster and easier —and cut your fastening costs.

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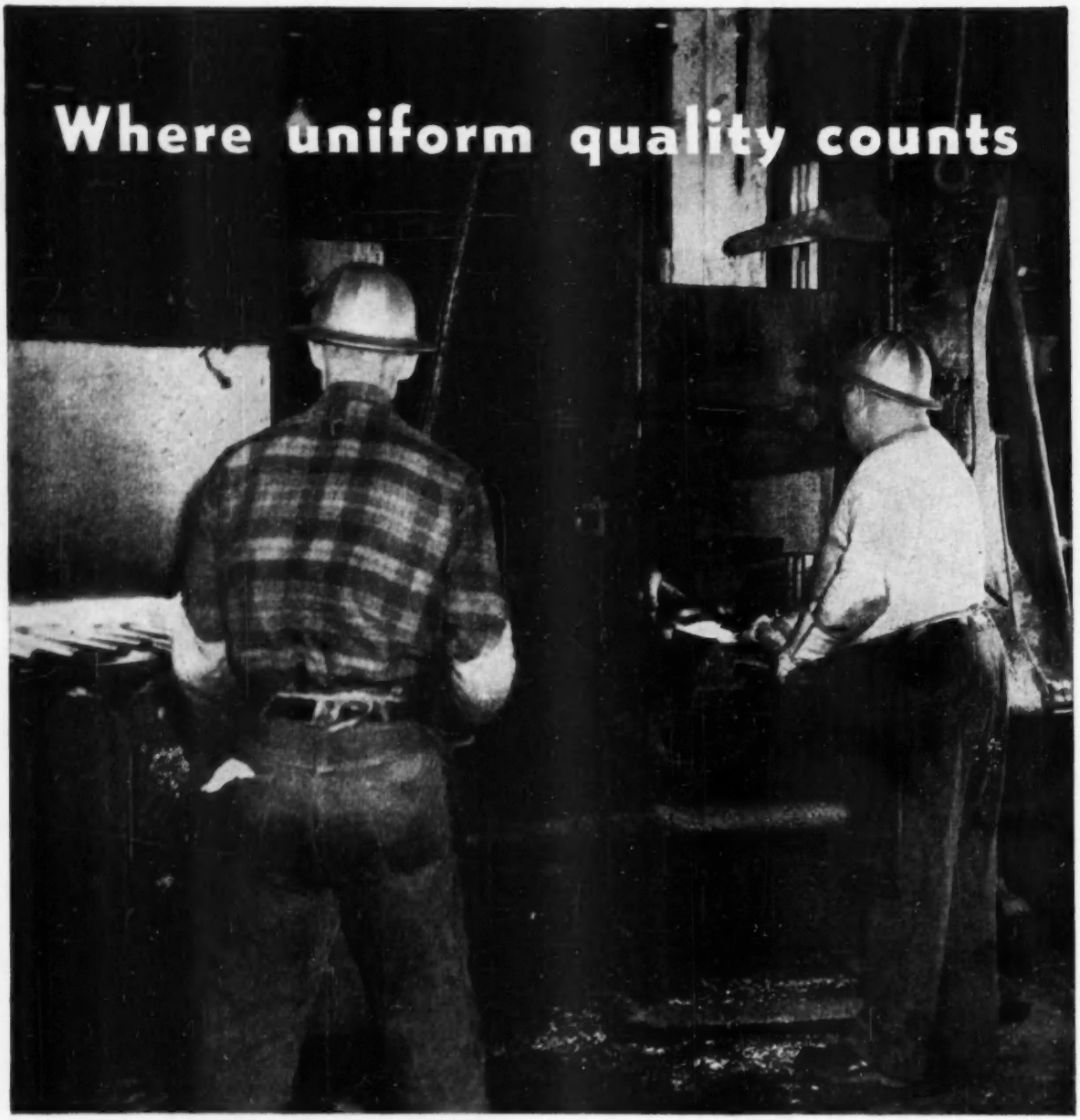
AIRengineering . . .

the modern way to faster production



● It's in the heating furnace and the forging press that the dependable quality of Youngstown Hot Rolled Alloy Bars shows up. Operators know that Youngstown bars are uniformly free of injurious seams, piping, laps and cracks. That insures maximum output of defect-free products.

Youngstown

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THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

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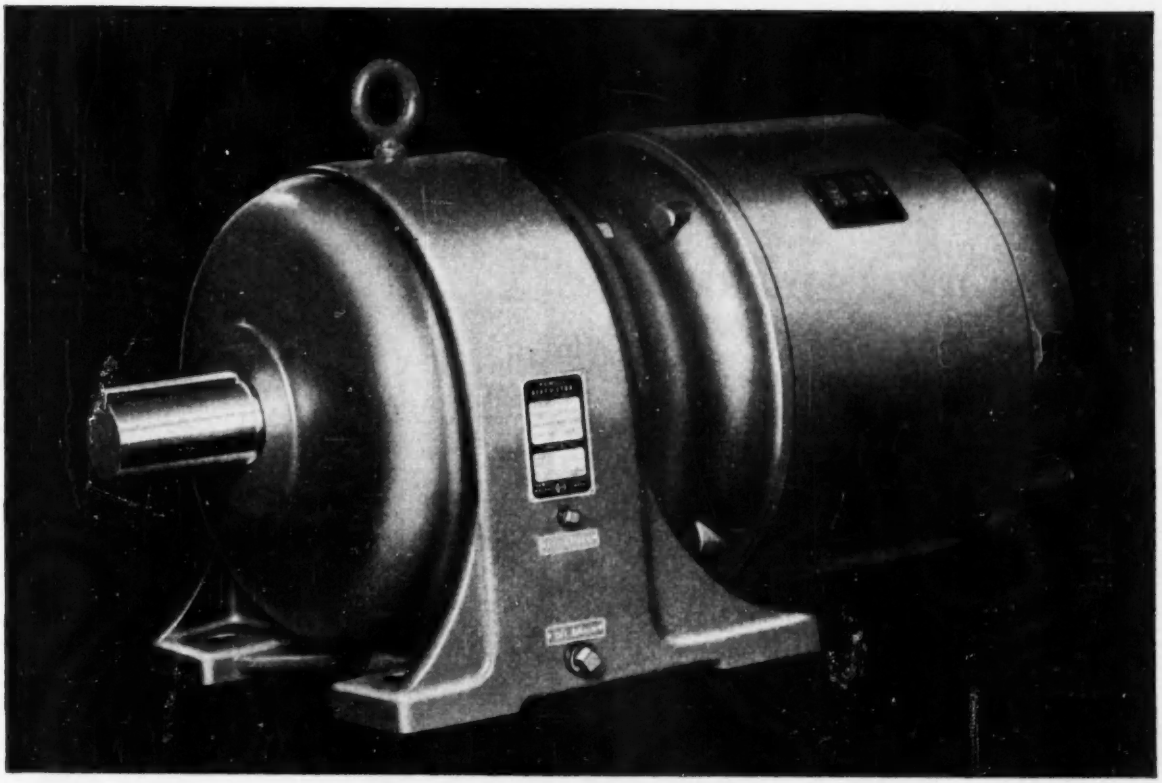
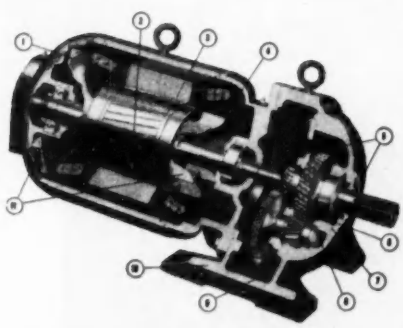


The power you need at the speed you need it . . .

HOWELL GEAR MOTORS



11 reasons why Howell Gear Motors last longer, serve you better

1. High-quality insulation
2. Copper-clad rotor
3. Expert craftsmanship
4. High-quality coil varnish
5. Leakproof oil seals
6. Duti-Rated Lifetime Gearing
7. Unit case construction with integral bearing housings
8. Corner-mounted offset shaft
9. Large oil reservoir
10. Heavy, cast-iron construction
11. Superior cooling

New dependability, greater starting torque and top efficiency, with output speeds as low as 7.5 rpm. are now available in Howell Gear Motors.

This compact, single-unit motor may well be the answer to your gear reduction problems. Combining the finest in heavy duty industrial gearing with the best in motoring, Howell Gear Motors reduce drive failures and production downtime.

Howell Gear Motors use duti-rated, lifetime gearing, with file-hard tooth surfaces and tough, resilient cores. They are available in all types of enclosures, from 7.5 to 780 rpm. with a capacity range from 1 to 30 hp., in all three AGMA service classifications.

For full information on Howell Gear Motors, contact the Howell man in your area, or write the factory direct for Bulletin GM-1.

HOWELL Red Band MOTORS

HOWELL MOTORS

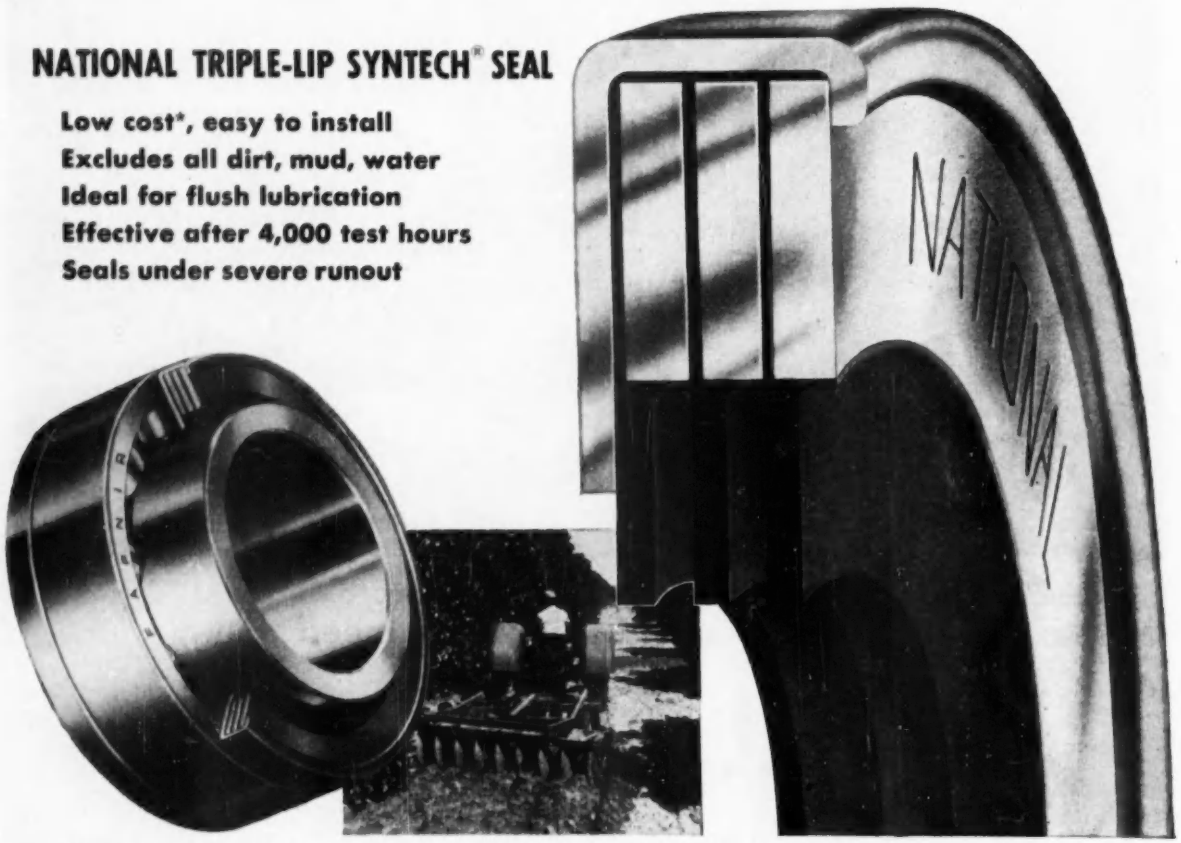
HOWELL ELECTRIC MOTORS COMPANY, HOWELL, MICHIGAN

MOTORS FOR INDUSTRY SINCE 1915

NOW! Radically different shaft seal for extreme dust and dirt conditions!

NATIONAL TRIPLE-LIP SYNTECH® SEAL

Low cost*, easy to install
Excludes all dirt, mud, water
Ideal for flush lubrication
Effective after 4,000 test hours
Seals under severe runout



John Deere-Killefer *Disk Harrows are now equipped with heavy duty Fafnir ball bearings protected by National Triple-Lip Syntech Seals. The new assembly reduces friction and drag, increases bearing life, and requires lubrication only once every 300 hours or once a year in normal use!*

National Triple-Lip Syntech is a completely different type of shaft seal providing a new standard of bearing protection for equipment operating in severe dust, dirt, mud or water conditions.

The seal is extremely simple in design, low cost, and easy to install. It consists of three identical synthetic rubber sealing members bonded to metal washers and enclosed in a rigid steel outer case. The sealing members are National Syntech, dependable, all-purpose synthetic rubber compound.

Use of thin Syntech sections as sealing lips keeps torque low, makes flush lubrication easy, and enables the seal to accept a large amount of runout and misalignment.

For complete information, call your National Applications Engineer or write direct.

*Compared to most conventional, multiple-lip seals.

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OIL & GREASE SEALS
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NATIONAL MOTOR BEARING CO., INC.
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Highest precision construction makes this drill revolutionary!

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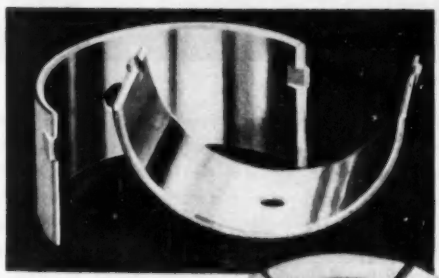
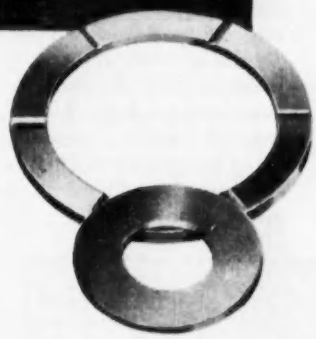
JOHNSON
BRONZE • ON • STEEL

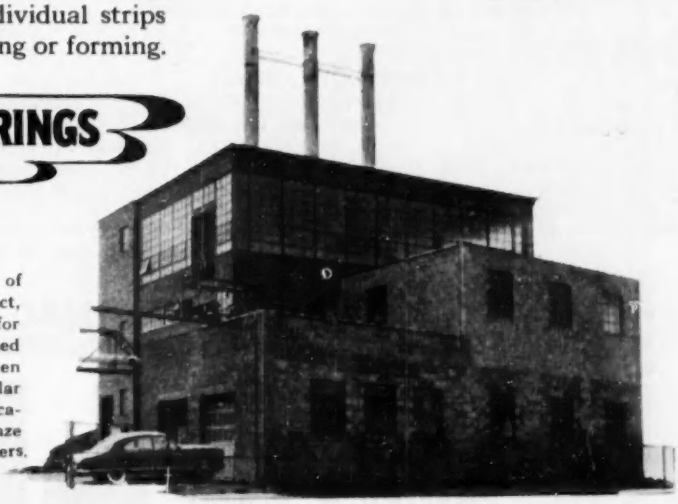
BOTH SURFACES





Where "two-side" bearing surfaces are required, Johnson Bronze-on-Steel is the answer. Floating connecting rod bearings often require this type of metal, also thrust washers. They are produced by bonding pre-cast bronze powder* to both sides of steel strip. This combines the fine bearing properties of copper-lead alloy with the strength and other properties of steel. This material is available in bearing form, or in strip form—rolls up to 400 feet or individual strips of any length for your own stamping or forming.

JOHNSON JB BEARINGS
Sleeve-Type



* To assure complete laboratory control of quality from the ingot to the finished product, Johnson Bronze has built a new powder plant for the production of alloy type powders by a patented process of disintegrating and quenching molten alloys. Therefore, the correct alloy for a particular use can always be prepared to correct specifications. This is another reason why Johnson Bronze has become known as Sleeve Bearing Headquarters.

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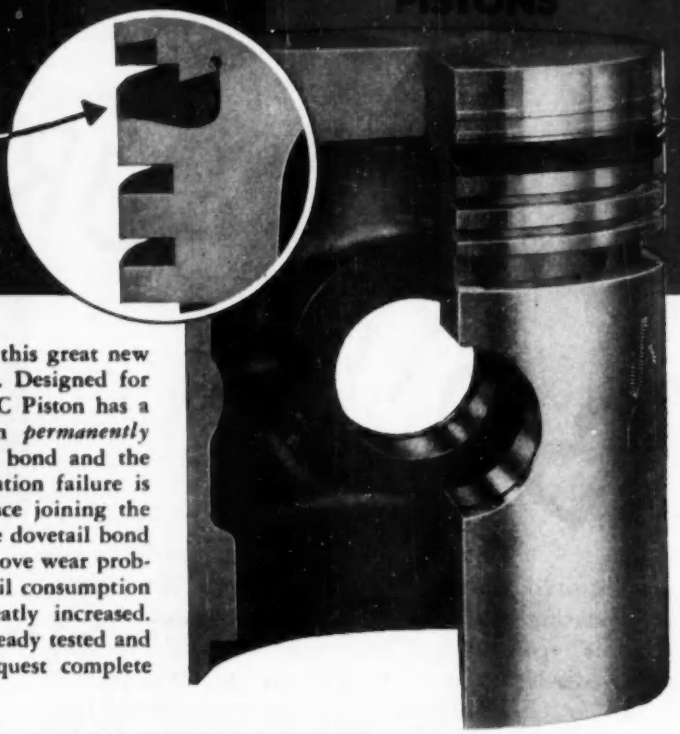
STOPS! RING GROOVE WEAR

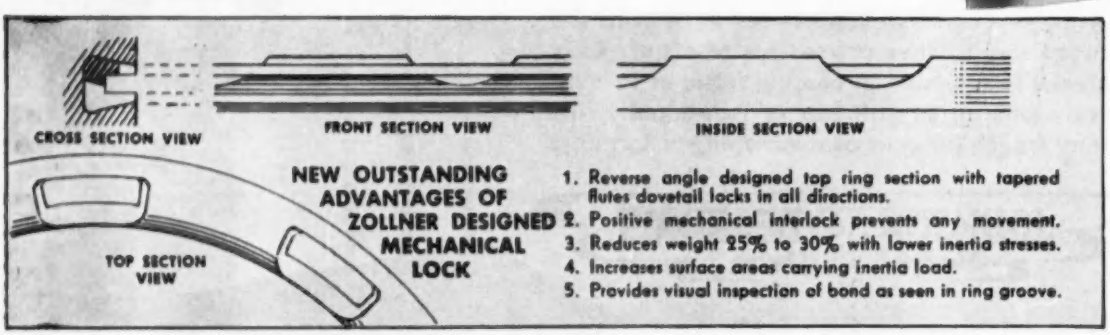
Double Bonded

METALLURGICALLY
Al-Fin Bond

MECHANICALLY
Zollner Lock



Up to 5 times more mileage is typical of this great new piston development by Zollner engineers. Designed for the most severe service, the BOND-O-LOC Piston has a "Ni-resist" iron top ring groove section *permanently* incorporated by *both* Al-Fin metallurgic bond and the exclusive Zollner mechanical lock. Separation failure is impossible. Reverse angles on every surface joining the "Ni-resist" iron section provide a multiple dovetail bond which is infinitely wedge-locked. Ring groove wear problems are eliminated, blow-by prevented, oil consumption reduced, mileage between overhauls greatly increased. Many heavy duty engine builders have already tested and approved BOND-O-LOC advantages. Request complete information, now.



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in cooperation with engine builders

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THE ORIGINAL EQUIPMENT PISTONS

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fasten it and forget it...

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Tight, vibration-proof fastenings—*for the life of your product.*

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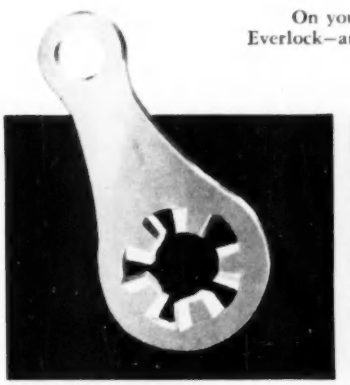
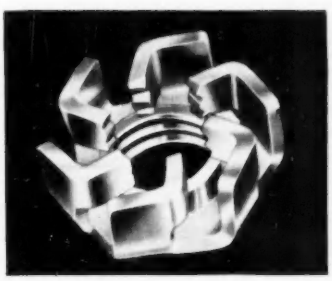
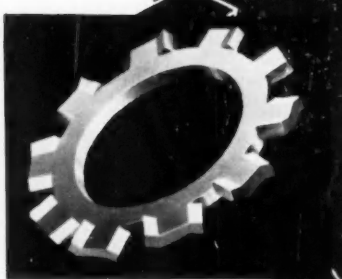


TERMINALS
Plain and lock types.



LOCKNUTS
Both National fine and National coarse threads.



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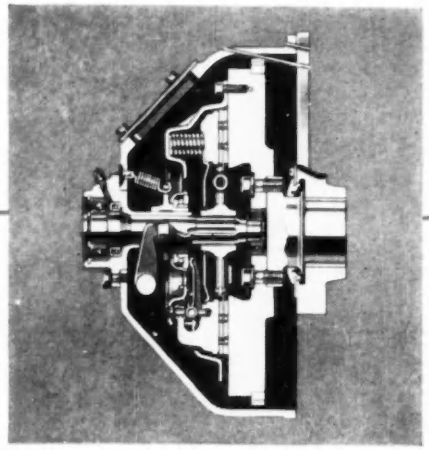

Cutaway shows New Departure **ball** bearing application in the clutch shaft and pilot positions.

Another **NEW** Tractor Calls for **NEW DEPARTURES**

In the Massey-Harris "44 Special" tractor, you'll find New Departures at work . . . in the generator, clutch shaft, clutch pilot, power take-off and belt pulley drives.

Throughout the farm field, New Departures have proved themselves. They carry thrust, radial or combined loads . . . support moving parts with rigid accuracy . . . allow simple, rugged designs. Above all, New Departure **ball** bearings mean longest life with lowest possible upkeep costs.

So when you design for the farm, *talk with your New Departure engineer.*

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